SYBASE®
An SAP® Company

Reference: Statements and Options

SAP Sybase IQ 16.0

DOCUMENT ID: DC00801-01-1600-01
LAST REVISED: February 2013

Sybase, Inc., One Sybase Drive, Dublin, CA 94568.

Contents

Audience

This book is for Sybase® IQ users who require reference material for SAP® Sybase® IQ SQL statements and database options.

Reference material for other aspects of SAP Sybase IQ, including language elements, data types, functions, system procedures, and system tables is provided in *Reference: Building Blocks, Tables, and Procedures*. Other books provide more context on how to perform particular tasks. This reference book is the place to look for information such as available SQL syntax, parameters, and options. For command line utility start-up parameters, see the *Utility Guide*.

SQL Statements

Descriptions of the SQL statements available in SAP Sybase IQ, including some that can be used only from Embedded SQL or Interactive SQL.

Common Elements in SQL Syntax

Language elements that are found in the syntax of many SQL statements.

For more information on the elements described here, see *Identifiers*, *Search Conditions*, *Expressions*, and *Strings* in *Reference: Building Blocks, Tables, and Procedures > SQL Language Elements*.

- column-name – an identifier that represents the name of a column.
- condition – an expression that evaluates to TRUE, FALSE, or UNKNOWN.
- connection-name – a string representing the name of an active connection.
- data-type – a storage data type.
- expression – an expression.
- filename – a string containing a file name.
- host-variable – a C language variable, declared as a host variable, preceded by a colon.
- indicator-variable – a second host variable of type `short int` immediately following a normal host variable. An indicator variable must also be preceded by a colon. Indicator variables are used to pass NULL values to and from the database.
- number – any sequence of digits followed by an optional decimal part and preceded by an optional negative sign. Optionally, the number can be followed by an ‘e’ and then an exponent. For example,

  ```
  42
  -4.038
  .001
  3.4e10
  1e-10
  ```
- owner – an identifier representing the user ID who owns a database object.
- role-name – an identifier representing the role name of a foreign key.
- savepoint-name – an identifier that represents the name of a savepoint.
- search-condition – a condition that evaluates to TRUE, FALSE, or UNKNOWN.
- special-value – one of the special values described in *Reference: Building Blocks, Tables, and Procedures > SQL Language Elements > Special Values* .
- statement-label – an identifier that represents the label of a loop or compound statement.
- table-list – a list of table names, which might include correlation names. For more information, see *FROM clause*.

- table-name – an identifier that represents the name of a table.
- userid – an identifier representing a user name. The user ID is not case-sensitive and is unaffected by the setting of the `CASE RESPECT` property of the database.
- variable-name – an identifier that represents a variable name.

See also

- *FROM Clause* on page 288

Syntax Conventions

Conventions used in the SQL syntax descriptions.

- Keywords – all SQL keywords appear in UPPERCASE; however, SQL keywords are case-insensitive, so you can type keywords in any case. For example, SELECT is the same as Select, which is the same as select.
- Placeholders – items that must be replaced with appropriate identifiers or expressions are shown in *italics*.
- Continuation – lines beginning with an ellipsis (…) are a continuation from the previous line.
- Optional portions – optional portions of a statement are enclosed by square brackets. For example:

  ```
  RELEASE SAVEPOINT [ savepoint-name ]
  ```

  This example indicates that the *savepoint-name* is optional. Do not type the square brackets.
- Repeating items – lists of repeating items are shown with an element of the list followed by an ellipsis. One or more list elements are allowed. When more than one is specified, they must be separated by commas if indicated as such. For example:

  ```
  UNIQUE ( column-name [ , ... ] )
  ```

  The example indicates that you can specify *column-name* more than once, separated by commas. Do not type the square brackets.
- Alternatives – when one option must be chosen, the alternatives are enclosed in curly braces. For example:

  ```
  [ QUOTES { ON | OFF } ]
  ```

  The example indicates that if you choose the QUOTES option, you must provide one of ON or OFF. Do not type the braces.
- One or more options – if you choose more than one, separate your choices by commas. For example:

  ```
  { CONNECT, DBA, RESOURCE }
  ```

Statement Applicability Indicators

Some statement titles are followed by an indicator in square brackets that shows where the statement can be used.

These indicators are as follows:

- [ESQL] – the statement is for use in Embedded SQL.
- [Interactive SQL] – the statement is for use only in Interactive SQL (**dbisql**).
- [SP] – the statement is for use in stored procedures or batches.
- [T-SQL] – the statement is implemented for compatibility with Adaptive Server® Enterprise. In some cases, the statement cannot be used in stored procedures that are not Transact-SQL format. In other cases, there is an alternative statement that is closer to the ISO/ANSI SQL standard that is recommended unless Transact-SQL compatibility is an issue.

If two sets of brackets are used, the statement can be used in both environments. For example, [ESQL] [SP] means a statement can be used either in Embedded SQL or in stored procedures.

ALLOCATE DESCRIPTOR Statement [ESQL]

Allocates space for a SQL descriptor area (SQLDA).

Syntax

```
ALLOCATE DESCRIPTOR descriptor-name
… [ WITH MAX { integer | host-variable } ]
```

Parameters

- **descriptor-name –** *string*

Examples

- **Example 1 –** This sample program includes an example of **ALLOCATE DESCRIPTOR** statement usage.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>


EXEC SQL INCLUDE SQLCA;


#include <sqldef.h>
```

```
EXEC SQL BEGIN DECLARE SECTION;
int         x;
short       type;
int         numcols;
char        string[100];
a_sql_statement_number  stmt = 0;
EXEC SQL END DECLARE SECTION;

int main(int argc, char * argv[])
{
  struct sqlda *      sqlda1;

  if( !db_init( &sqlca ) ) {
      return 1;
  }
    db_string_connect(&sqlca, "UID=dba;PWD=sql;DBF=d:\\IQ-16_0\
\sample.db");

  EXEC SQL ALLOCATE DESCRIPTOR sqlda1 WITH MAX 25;

  EXEC SQL PREPARE :stmt FROM
        'select * from Employees';
  EXEC SQL DECLARE curs CURSOR FOR :stmt;
  EXEC SQL OPEN curs;

  EXEC SQL DESCRIBE :stmt into sqlda1;
  EXEC SQL GET DESCRIPTOR sqlda1 :numcols=COUNT;
      // how many columns?
  if( numcols > 25 ) {
      // reallocate if necessary
      EXEC SQL DEALLOCATE DESCRIPTOR sqlda1;
      EXEC SQL ALLOCATE DESCRIPTOR sqlda1
          WITH MAX :numcols;
  }
  type = DT_STRING;   // change the type to string
  EXEC SQL SET DESCRIPTOR sqlda1 VALUE 2 TYPE = :type;
  fill_sqlda( sqlda1 );  // allocate space for the variables

  EXEC SQL FETCH ABSOLUTE 1 curs USING DESCRIPTOR sqlda1;
  EXEC SQL GET DESCRIPTOR sqlda1 VALUE 2 :string = DATA;

  printf("name = %s", string );

  EXEC SQL DEALLOCATE DESCRIPTOR sqlda1;
  EXEC SQL CLOSE curs;
  EXEC SQL DROP STATEMENT :stmt;

  db_string_disconnect( &sqlca, "" );
  db_fini( &sqlca );

  return 0;
}
```

Usage

You must declare the following in your C code prior to using this statement:

```
struct sqlda * descriptor_name
```

The WITH MAX clause lets you specify the number of variables within the descriptor area. The default size is 1.

You must still call **fill_sqlda** to allocate space for the actual data items before doing a fetch or any statement that accesses the data within a descriptor area.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Open Client/Open Server.

See also

- *DEALLOCATE DESCRIPTOR Statement [ESQL]* on page 230

ALTER DATABASE Statement

Upgrades a database created with a previous version of the software, adds or removes jConnect™ for JDBC™ support, or defines management of system procedure execution. Run this statement with DBISQL Interactive SQL.

Syntax

```
ALTER DATABASE UPGRADE
      [ PROCEDURE ON ]
      [ JCONNECT { ON | OFF } ]
      [ RESTART { ON | OFF } ]
      [ SYSTEM PROCEDURE AS DEFINER {ON | OFF} ]
```

Examples

- **Example 1 –** disables jConnect support:

  ```
  ALTER DATABASE UPGRADE JCONNECT OFF
  ```

Usage

The **ALTER DATABASE** statement upgrades databases created with earlier versions of the software. This applies to maintenance releases as well as major releases.

When you upgrade a database, SAP Sybase IQ makes these changes:

- Upgrades the system tables to the current version.

- Adds any new database options.
- Enables new features in the current version.

You can also use **ALTER DATABASE UPGRADE** simply to add jConnect features, if the database was created with the current version of the software.

Note:

- See the *Installation and Configuration Guide* for backup recommendations before you upgrade.
- Be sure to start the server in a way that restricts user connections before you run **ALTER DATABASE UPGRADE**. For instructions and other upgrade caveats, see the *Migration* guide for your platform.
- Use the **iqunload** utility to upgrade databases created in versions earlier than 15.0. See the *Migration* guide for your platform.

After using **ALTER DATABASE UPGRADE**, shut down the database.

- **PROCEDURE clause –** drops and re-creates all dbo- and sys-owned procedures in the database.
- **JCONNECT clause –** to allow the SAP Sybase IQ jConnect JDBC driver to access system catalog information, you must specify **JCONNECT ON**. This installs jConnect system tables and procedures. To exclude the jConnect system objects, specify **JCONNECT OFF**. You can still use JDBC, as long as you do not access system catalog information. The default is to include jConnect support (**JCONNECT ON**).
- **RESTART clause –** when RESTART ON is specified and the AutoStop connection parameter is set to No, the database restarts after it is upgraded. Otherwise, the database is stopped after an upgrade. RESTART is ON by default.
- **SYSTEM PROCEDURE AS DEFINER clause –** defines whether a privileged system procedure runs with the privileges of the invoker (the person executing the procedure) or the definer (the owner of the procedure).

  OFF means all privileged system procedures execute with the privileges of the invoker. Use **sp_proc_priv()** to identify the system privileges required to run a system procedure.

  ON (default), or not specified means:

  - when upgrading a pre-16.0 database, pre-16.0 privileged system procedures execute with the privileges of the definer and 16.0 or later privileged system procedures execute with the privileges of the invoker.
  - when upgrading a database that is version 16.0 or later, the default is the behavior of the database being upgraded.

  Changing the execution model after upgrade may result in loss of functionality on custom stored procedures and applications that explicitly grant EXECUTE privilege on system

procedures. It may also impact the ability to run system procedures. See *Reference: Building Blocks, Tables, and Procedures > System Procedures*.

Side effects:

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the ALTER DATABASE system privilege.

See also

- *CREATE DATABASE Statement* on page 103

ALTER DBSPACE Statement

Changes the read/write mode, changes the size, or extends an existing dbspace.

Syntax

```
ALTER DBSPACE dbspace-name
{ ADD new-file-spec  [, new-file-spec ... ]
| DROP FILE logical-file-name [, FILE logical-file-name ... ]
  |   RENAME TO newname |   RENAME 'new-file-pathname'
  |  READONLY  |  READWRITE
  |   ONLINE   |  OFFLINE
  |  STRIPING{  ON  |   OFF  }
  |  STRIPESIZEKB size-in-KB
ALTER FILE file-name
{ READONLY   |   [ FORCE ] READWRITE  }
  | SIZE file-size [ KB | MB | GB | TB ]
  | ADD file-size  [ KB  |  MB  |  GB |  TB  | PAGES ] }
RENAME PATH  'new-file-pathname'
RENAME TO newname
```

Parameters

- **new-file-spec –**

  ```
  FILE logical-file-name 'file-path' iq-file-opts
  ```

- **iq-file-opts –**

```
[ [ SIZE ] file-size ]
…[ KB | MB | GB | TB ] ]
   [ RESERVE reserve-size [ KB | MB | GB | TB ] ]
```

Examples

- **Example 1 –** Change the mode of a dbspace called `DspHist` to **READONLY**.

```
ALTER DBSPACE DspHist READONLY
```

- **Example 2 –** Add 500MB to the dbspace `DspHist` by adding the file `FileHist3` of size 500MB.

```
ALTER DBSPACE DspHist
ALTER FILE FileHist3 ADD 500MB
```

- **Example 3 –** On a UNIX system, add two 500MB files to the dbspace DspHist.

```
ALTER DBSPACE DspHist ADD
FILE FileHist3 '/History1/data/file3' SIZE 500MB,
FILE FileHist4 '/History1/data/file4' SIZE 500
```

- **Example 4 –** Increase the size of the dbspace `IQ_SYSTEM_TEMP` by 2GB.

```
ALTER DBSPACE IQ_SYSTEM_TEMP ADD 2 GB
```

- **Example 5 –** Remove two files from dbspace DspHist. Both files must be empty.

```
ALTER DBSPACE DspHist
DROP FILE FileHist2, FILE FileHist4
```

- **Example 6 –** Increase the size of the dbspace `IQ_SYSTEM_MAIN` by 1000 pages. (**ADD** defaults to pages.)

```
ALTER DBSPACE IQ_SYSTEM_MAIN ADD 1000
```

Usage

ALTER DBSPACE changes the read-write mode, changes the online/offline state, alters the file size, renames the dbspace name, file logical name or file path, or sets the dbspace striping parameters. For details about existing dbspaces, run **sp_iqdbspace** procedure, **sp_iqdbspaceinfo** procedure, **sp_iqfile** procedure, **sp_iqdbspaceobjectinfo**, and **sp_iqobjectinfo**. Dbspace and dbfile names are always case-insensitive. The physical file paths are case-sensitive, if the database is **CASE RESPECT** and the operating system supports case-sensitive files. Otherwise, the file paths are case-insensitive.

Enclose dbspace and dbfile names either in no quotes or in double quotes. Enclose the physical file path to the dbfile in single quotes.

In Windows, if you specify a path, any backslash characters (\) must be doubled if they are followed by an n or an x. This prevents them being interpreted as a newline character (\n) or as a hexadecimal number (\x), according to the rules for strings in SQL. It is safer to always double the backslash.

- **ADD FILE clause –** adds one or more files to the specified dbspace. The dbfile name and the physical file path are required for each file and must be unique. You can add files to IQ main, IQ shared temporary, or IQ temporary dbspaces. You may add a file to a read-only dbspace, but the dbspace remains read-only. You can add files to multiplex shared temporary dbspaces only in read-only mode (the default for **ADD FILE**).

A catalog dbspace may contain only one file, so **ADD FILE** may not be used on catalog dbspaces.

For an RLV dbspace, use **ADD FILE** on simplex servers only. You cannot add a file to a multiplex RLV dbspace.

- **DROP FILE clause –** removes the specified file from an IQ dbspace. The file must be empty. You cannot drop the last file from the specified dbspace. Instead use DROP DBSPACE if the dbspace contains only one file. Rename TO clause—Renames the *dbspace-name* to a new name. The new name must be unique in the database. You cannot rename `IQ_SYSTEM_MAIN`, `IQ_SYSTEM_MSG`, `IQ_SYSTEM_TEMP`, `IQ_SHARED_TEMP`, or `SYSTEM`.
- **RENAME clause –** renames the pathname of the dbspace that contains a single file. It is semantically equivalent to the **ALTER FILE RENAME PATH** clause. An error is returned if the dbspace contains more than one file.
- **READONLY clause –** changes any dbspace except `IQ_SYSTEM_MAIN`, `IQ_SYSTEM_TEMP`, `IQ_SYSTEM_MSG`, `IQ_SHARED_TEMP`, and `SYSTEM` to read-only. Disallows DML modifications to any object currently assigned to the dbspace. Can only be used for dbspaces in the IQ main store.
- **READWRITE clause –** changes the dbspace to read-write. The dbspace must be online. Can only be used for dbspaces in the IQ main store.
- **ONLINE clause –** puts an offline dbspace and all associated files online. Can only be used for dbspaces in the IQ main store.
- **OFFLINE clause –** puts an online read-only dbspace and all associated files offline. (Returns an error if the dbspace is read-write, offline already, or not of the IQ main store.) Can only be used for dbspaces in the IQ main store.
- **STRIPING clause –** changes the disk striping on the dbspace as specified. When disk striping is set ON, data is allocated from each file within the dbspace in a round-robin fashion. For example, the first database page written goes to the first file, the second page written goes to the next file within given dbspace, and so on. Read-only dbspaces are skipped.
- **STRIPESIZEKB clause –** specifies the number of kilobytes (KB) to write to each file before the disk striping algorithm moves to the next stripe for the specified dbspace.

- **ALTER FILE READONLY –** changes the specified file to read-only. The file must be associated with an IQ main dbspace. You cannot change files in IQ_SHARED_TEMP to READONLY status.
- **ALTER FILE READWRITE –** changes specified IQ main or temporary store dbfile to read-write. The file must be associated with an IQ main or temporary dbspace.
- **ALTER FILE FORCE READWRITE –** changes the status of the specified shared temporary store dbfile to read-write, although there may be known file status problems on secondary nodes. The file may be associated with an IQ main, shared temporary, or temporary dbspace, but because new dbfiles in `IQ_SYSTEM_MAIN` and user main are created read-write, this clause only affects shared temporary dbspaces.
- **ALTER FILE SIZE clause –** specifies the new size of the file in units of kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB). The default is megabytes. You can increase the size of the dbspace only if the free list (an allocation map) has sufficient room and if the dbspace has sufficient reserved space. You can decrease the size of the dbspace only if the portion to be truncated is not in use.
- **ALTER FILE ADD clause –** extends the size of the file in units of pages, kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB). The default is MB. You can ADD only if the free list (an allocation map) has sufficient room and if the dbspace has sufficient reserved space.
- **ALTER FILE RENAME PATH clause –** renames the file pathname associated with the specified file. This clause merely associates the file with the new file path instead of the old path. The clause does not actually change the operating system file name. You must change the file name through your operating system. The dbspace must be offline to rename the file path. The new path is used when the dbspace is altered online or when the database is restarted.

You may not rename the path of a file in `IQ_SYSTEM_MAIN`, because if the new path were not accessible, the database would be unable to start. If you need to rename the path of a file in `IQ_SYSTEM_MAIN`, make the file read-only, empty the file, drop the file, and add the file again with the new file path name.

- **ALTER FILE RENAME TO clause –** renames the specified file's logical name to a new name. The new name must be unique in the database.

Side effects:

- Automatic commit
- Automatic checkpoint
- A mode change to **READONLY** causes immediate relocation of the internal database structures on the dbspace to one of the read-write dbspaces.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY DBSPACE system privilege.

See also

- *CREATE DATABASE Statement* on page 103
- *CREATE DBSPACE Statement* on page 114
- *DROP Statement* on page 248

ALTER DOMAIN Statement

Renames a user-defined domain or data type. Does not rename Java types.

Syntax

```
ALTER { DOMAIN | DATATYPE } user-type
RENAME new-name
```

Parameters

- **new-name –** an identifier representing the new domain name.
- **user-type –** user-defined data type of the domain being renamed.

Examples

- **Example 1 –** Rename the Address domain to MailingAddress:

```
ALTER DOMAIN Address RENAME MailingAddress
```

Usage

The **ALTER DOMAIN** statement updates the name of the user-defined domain or data type in the SYSUSERTYPE system table.

You must recreate any procedures, views or events that reference the user-defined domain or data type, or else they will continue to reference the former name.

Side effects:

- Automatic commit

Permissions

Must be the database user who created the domain or requires the ALTER DATATYPE or ALTER ANY OBJECT system privilege.

See also

- *CREATE DOMAIN Statement* on page 117

ALTER EVENT Statement

Changes the definition of an event or its associated handler for automating predefined actions. Also alters the definition of scheduled actions.

Syntax

```
ALTER EVENT event-name
[ DELETE TYPE | TYPE event-type ]
{     WHERE { trigger-condition | NULL }
    | { ADD | [ MODIFY ] | DELETE } SCHEDULE schedule-spec
}
[ ENABLE | DISABLE ]
[ [ MODIFY ] HANDLER compound-statement | DELETE HANDLER }
```

Parameters

- **event-type** – **BackupEnd** | **"Connect"** | **ConnectFailed** | **DatabaseStart** | **DBDiskSpace** | **"Disconnect"** | **GlobalAutoincrement** | **GrowDB** | **GrowLog** | **GrowTemp** | **LogDiskSpace** | **"RAISERROR"** | **ServerIdle** | **TempDiskSpace**
- **trigger-condition** – [**event_condition(** *condition-name* **)** { **=** | **<** | **>** | **!=** | **<=** | **>=** } *value*]
- **schedule-spec** – [*schedule-name*] { **START TIME** *start-time* | **BETWEEN** *start-time* **AND** *end-time* } [**EVERY** *period* { **HOURS** | **MINUTES** | **SECONDS** }] [**ON** { (*day-of-week*, …) | (*day-of-month*, …) }] [**START DATE** *start-date*]
- **event-name | schedule-name** – *identifier*
- **day-of-week** – *string*
- **value | period | day-of-month** – *integer*
- **start-time | end-time** – *time*
- **start-date** – *date*

Usage

ALTER EVENT lets you alter an event definition created with **CREATE EVENT**. Possible uses include:

- Change an event handler during development.

- Define and test an event handler without a trigger condition or schedule during a development phase, and then add the conditions for execution using **ALTER EVENT** once the event handler is completed.
- Disable an event handler temporarily by disabling the event.

When you alter an event using **ALTER EVENT**, specify the event name and, optionally, the schedule name.

List event names by querying the system table `SYSEVENT`. For example:

```
SELECT event_id, event_name FROM SYS.SYSEVENT
```

List schedule names by querying the system table `SYSSCHEDULE`. For example:

```
SELECT event_id, sched_name FROM SYS.SYSSCHEDULE
```

Each event has a unique event ID. Use the `event_id` columns of `SYSEVENT` and `SYSSCHEDULE` to match the event to the associated schedule.

- **DELETE TYPE clause –** removes an association of the event with an event type.
- **ADD | MODIFY | DELETE SCHEDULE clause –** changes the definition of a schedule. Only one schedule can be altered in any one **ALTER EVENT** statement.
- **WHERE clause –** the **WHERE NULL** option deletes a condition.

For descriptions of most of the parameters, see *CREATE EVENT Statement*.

Side effects:

- Automatic commit

Permissions

Requires one of:

- MANAGE ANY EVENT system privilege.
- ALTER ANY OBJECT system privilege.

See also

- *BEGIN … END Statement* on page 81
- *CREATE EVENT Statement* on page 119

ALTER FUNCTION Statement

Modifies an existing function. Include the entire modified function in the **ALTER FUNCTION** statement.

Syntax

Syntax 1

```
ALTER FUNCTION [ owner.]function-name function-definition
```

```
function-definition : CREATE FUNCTION syntax
```

Syntax 2

```
ALTER FUNCTION [ owner.]function-name
```

```
 SET HIDDEN
```

Syntax 3

```
ALTER FUNCTION [ owner.]function-name
```

```
 RECOMPILE
```

Usage

- **Syntax 1 –** identical in syntax to the **CREATE FUNCTION** statement except for the first word. Either version of the **CREATE FUNCTION** statement can be altered.

  Existing permissions on the function are maintained and do not have to be reassigned. If a **DROP FUNCTION** and **CREATE FUNCTION** were carried out, execute permissions must be reassigned.

- **Syntax 2 –** use **SET HIDDEN** to scramble the definition of the associated function and cause it to become unreadable. The function can be unloaded and reloaded into other databases.

Warning! The **SET HIDDEN** setting is irreversible. If you need the original source again, you must maintain it outside the database.

- **Syntax 3 –** use **RECOMPILE** to recompile a user-defined function. When you recompile a function, the definition stored in the catalog is re-parsed and the syntax is verified. The preserved source for a function is not changed by recompiling. When you recompile a function, the definitions scrambled by the **SET HIDDEN** clause remain scrambled and unreadable.

Side effects:

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.

Permissions

Alter a Watcom SQL or Transact-SQL function – Requires one of:

- ALTER ANY PROCEDURE system privilege.
- ALTER ANY OBJECT system privilege.
- You own the function.

Alter an external C/C++ Scalar or Aggregate, or external Java function – Requires one of:

- Requires CREATE EXTERNAL REFERENCE system privilege.
- Also requires one of:
  - ALTER ANY PROCEDURE system privilege.
  - ALTER ANY OBJECT system privilege.
  - You own the function.

See also

- *ALTER PROCEDURE Statement* on page 35
- *CREATE FUNCTION Statement* on page 128
- *DROP Statement* on page 248

ALTER INDEX Statement

Renames indexes in base or global temporary tables, foreign key role names of indexes and foreign keys explicitly created by a user, or changes the clustered nature of an index on a catalog store table.

Syntax

```
ALTER { INDEX index-name
| [ INDEX ] FOREIGN KEY role-name
| [ INDEX ] PRIMARY KEY
| ON [owner.]table-name   { rename-clause | move-clause | cluster-
clause}
```

Parameters

- **rename-clause – RENAME TO** | **AS** *new-name*
- **move-clause – MOVE TO** *dbspace-name*
- **cluster-clause – CLUSTERED** | **NONCLUSTERED**

Examples

- **Example 1 –** Move the primary key, HG for c5, from dbspace Dsp4 to Dsp8:

```
CREATE TABLE foo (
    c1 INT IN Dsp1,
    c2 VARCHAR(20),
    c3 CLOB IN Dsp2,
    c4 DATE,
    c5 BIGINT,
    PRIMARY KEY (c5) IN Dsp4) IN Dsp3);

CREATE DATE INDEX c4_date ON foo(c4) IN Dsp5;

ALTER INDEX PRIMARY KEY ON foo MOVE TO Dsp8;
```

- **Example 2 –** Move **DATE** index from `Dsp5` to `Dsp9`:

```
ALTER INDEX c4_date ON foo MOVE TO Dsp9
```

- **Example 3 –** Rename an index `COL1_HG_OLD` in the table `jal.mytable` to `COL1_HG_NEW`:

```
ALTER INDEX COL1_HG_OLD ON jal.mytable
RENAME AS COL1_HG_NEW
```

- **Example 4 –** Rename a foreign key role name `ky_dept_id` in table `dba.Employees` to `emp_dept_id`:

```
ALTER INDEX FOREIGN KEY ky_dept_id
ON dba.Employees
RENAME TO emp_dept_id
```

Usage

The **ALTER INDEX** statement renames indexes and foreign key role names of indexes and foreign keys that were explicitly created by a user. Only indexes on base tables or global temporary tables can be renamed. You cannot rename indexes created to enforce key constraints.

- **ON clause –** the **ON** clause specifies the name of the table that contains the index or foreign key to rename.
- **RENAME [AS | TO] clause –** the **RENAME** clause specifies the new name of the index or foreign key role.
- **MOVE clause –** the MOVE clause moves the specified index, unique constraint, foreign key, or primary key to the specified dbspace. For unique constraint or foreign key, you must specify its unique index name.

  The **cluster-clause** specifies whether the index should be changed to CLUSTERED or NONCLUSTERED. Applies to catalog store tables only and only one index on a table can be clustered.

You must have CREATE privilege on the new dbspace and be the table owner or have the MANAGE ANY DBSPACE system privilege.

Note: Attempts to alter an index in a local temporary table return the error `index not found`. Attempts to alter a nonuser-created index, such as a default index (FP), return the error `Cannot alter index. Only indexes in base tables or global temporary tables with an owner type of USER can be altered.`

Side effects:

- Automatic commit. Clears the Results tab in the Results pane in Interactive SQL. Closes all cursors for the current connection.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

move-clause requires one of:

- MANAGE ANY DBSPACE system privilege.
- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- REFERENCE privilege on the table.
- You own the underlying table.
- REFERENCE privilege on the table along with one of:
  - CREATE ANY OBJECT system privilege.
  - CREATE privilege on the target dbspace.

cluster-clause for materialized view requires one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- You own the materialized view.

cluster-clause for all other indexes, requires one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- ALTER and REFERENCE privilege on the table.
- You own the table.

Any other clauses require one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- REFERENCE privilege on the table.
- You own the underlying table.

See also

- *ALTER TABLE Statement* on page 48
- *CREATE INDEX Statement* on page 136
- *CREATE TABLE Statement* on page 197

ALTER LDAP SERVER Statement

Any changes to an LDAP server configuration object are applied on subsequent connections. Any connection already started when the change is applied does not immediately reflect the change.

In addition to resetting LDAP server configuration object values for attributes, the **ALTER LDAP SERVER** statement allows an administrator to make manual adjustments to a server's state and behavior by putting the LDAP server configuration object in maintenance mode and returning it to service from maintenance mode.

Syntax

```
ALTER LDAP SERVER <ldapua-server-name>
{ <ldapua-server-attribs>
| [ WITH ( SUSPEND | ACTIVATE | REFRESH ) ] }

ldapua-server-attribs:
SEARCH DN
              URL { 'URL_string' | NULL }
              | ACCESS ACCOUNT { 'DN_string' | NULL }
              | IDENTIFIED BY ( 'password>' | NULL }
              | IDENTIFIED BY ENCRYPTED { encrypted-password | NULL }

| AUTHENTICATION URL { 'URL_string' | NULL }
| CONNECTION TIMEOUT timeout_value
| CONNECTION RETRIES retry_value
| TLS { ON | OFF }
```

Parameters

- **URL –** identifies the host (by name or by IP address), port number, and the search to be performed for the DN lookup for a given user ID. This value is validated for correct LDAP URL syntax before it is stored in the `ISYSLDAPSERVER` system table. The maximum size for this string is 1024 bytes.
- **ACCESS ACCOUNT –** a user created on the LDAP server for use by SAP Sybase IQ, not a user within SAP Sybase IQ. The distinguished name (DN) for this user is used to connect

to the LDAP server. This user has permissions within the LDAP server to search for DNs by user ID in the locations specified by the SEARCH DN URL. The maximum size for this string is 1024 bytes.

- **IDENTIFIED BY –** provides the password associated with the ACCESS ACCOUNT user. The password is stored using symmetric encryption on disk. Use the value NULL to clear the password and set it to none. The maximum size of a clear text password is 255 bytes.
- **IDENTIFIED BY ENCRYPTED –** configures the password associated with the ACCESS ACCOUNT distinguished name in an encrypted format. The binary value is the encrypted password and is stored on disk as is. Use the value NULL to clear the password and set it to none. The maximum size of the binary is 289 bytes. The encrypted key should be a valid varbinary value. Do not enclose the encrypted key in quotation marks.
- **AUTHENTICATION URL –** identifies the host (by name or IP address) and the port number of the LDAP server to use for authentication of the user. This is the value defined for <URL_string> and is validated for correct LDAP URL syntax before it is stored in `ISYSLDAPSERVER` system table. The DN of the user obtained from a prior DN search and the user password bind a new connection to the authentication URL. A successful connection to the LDAP server is considered proof of the identity of the connecting user. The maximum size for this string is 1024 bytes.
- **CONNECTION TIMEOUT –** specifies the connection timeout from SAP Sybase IQ to the LDAP server for both DN searches and authentication. This value is in milliseconds, with a default value of 10 seconds.
- **CONNECTION RETRIES –** specifies the number of retries on connections from SAP Sybase IQ to the LDAP server for both DN searches and authentication. The valid range of values is 1 – 60, with a default value of 3.
- **TLS –** defines whether the TLS or Secure LDAP protocol is used for connections to the LDAP server for both DN searches and authentication. When set to ON, the TLS protocol is used and the URL begins with "ldap://" When set to OFF (or not specified), Secure LDAP protocol is used and the URL begins with “ldaps://”. When using the TLS protocol, specify the database security option TRUSTED_CERTIFICATES_FILE with a file name containing the certificate of the Certificate Authority (CA) that signed the certificate used by the LDAP server.
- **WITH ACTIVATE –** sets the state of the LDAP server configuration object to READY and allows authentication with the LDAP server. Server option values are read from the ISYSLDAPSERVER system table and applied to new connections to the LDAP server and incoming authentication requests to the SAP Sybase IQ server. Upon successful authentication of a user, the state changes to ACTIVE.
- **WITH SUSPEND –** sets the state of the LDAP server configuration object to SUSPENDED, which puts the LDAP server configuration object in maintenance mode. Connections to the LDAP server are closed and authentication with the LDAP server becomes unavailable.
- **WITH REFRESH –** reinitializes LDAP user authentication. This command does not change the state of the LDAP server configuration object, nor does it change any existing connections from a client to the SAP Sybase IQ server. This parameter is typically used

with an LDAP server that is in an ACTIVE or READY state to release any resources that may be held or to reread changes made to files outside of the server, such as a change to the contents of the file specified by database option TRUSTED_CERTIFICATES_FILE.

Note: When the LDAP server is in any state other than ACTIVE or READY, REFRESH has no effect.

Examples

- **Example 1 –** suspends the LDAP server configuration object named `apps_primary`.

```
ALTER LDAP SERVER apps_primary SUSPEND
```

- **Example 2 –** changes the LDAP server configuration object named `apps_primary` to use a different URL for authentication on host `fairfax`, sets the port number to `1066`, sets the number of connection retries to `10`, and finally activates the LDAP server configuration object.

```
ALTER LDAP SERVER apps_primary
AUTHENTICATION URL 'ldap://my_LDAPserver:1066/'
CONNECTION RETRIES 10
WITH ACTIVATE
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY LDAP SERVER system privilege.

ALTER LOGICAL SERVER Statement

Modifies configuration for the existing user-defined logical server in the database.

Syntax

```
ALTER LOGICAL SERVER logical-server-name
    { alter-ls-clause } [ WITH STOP SERVER ]
```

Parameters

- ***alter-ls-clause* –**

```
{ADD MEMBERSHIP '(' { ls-member, ... } ')'
| DROP MEMBERSHIP '(' { ls-member, ... } ')'
| POLICY policy-name }
```

- ***ls-member* –**

```
FOR LOGICAL COORDINATOR
| mpx-server-name
```

Applies to

Multiplex only.

Examples

- **Example 1 –** alters a user-defined logical server by adding multiplex nodes `n1` and `n2` to logical server `ls1`:

```
ALTER LOGICAL SERVER ls1 ADD MEMBERSHIP (n1, n2)
```

- **Example 2 –** adds logical membership of COORDINATOR and drop a named membership of the current coordinator node `n1` from logical server `ls1`:

```
ALTER LOGICAL SERVER ls1 ADD MEMBERSHIP (FOR LOGICAL COORDINATOR)
ALTER LOGICAL SERVER ls1 DROP MEMBERSHIP (n1)
```

- **Example 3 –** changes the logical server policy for logical server `ls2` to policy `lsp1`.

```
ALTER LOGICAL SERVER ls2 POLICY lsp1
```

Usage

logical-server-name refers to an existing user-defined logical server name.

The `SYS.ISYSIQLSMEMBER` system table stores definitions for the logical server memberships.

A member node that is added to or dropped from a logical server starts or stops accepting logical server connections only after the TLV log corresponding to **ALTER LOGICAL SERVER** is played on that node. Existing connections of a logical server continue to run on a node when that node is dropped from the logical server, however, distributed processing is stopped for these connections.

An error is returned if:

- Any *ls-member* specified with the **ADD MEMBERSHIP** clause is already a member of the logical server.
- Any *ls-member* specified with the **DROP MEMBERSHIP** clause is not an existing member of the logical server.
- A logical server membership change causes a node to belong to multiple logical servers assigned to a single login policy. Logical server membership in a login policy cannot overlap.

WITH STOP SERVER automatically shuts down all servers in the logical server when the `TEMP_DATA_IN_SHARED_TEMP` option is changed directly or indirectly.

This statement enforces consistent shared system temporary store settings across physical nodes shared by logical servers.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

ALTER LOGIN POLICY Statement

Changes existing login policies or configures logical server access.

Syntax

Syntax 1

```
ALTER LOGIN POLICY policy-name
{ { ADD | DROP | SET } LOGICAL SERVER ls-assignment-list
[ LOGICAL SERVER ls-override-list ])
```

- ***ls-assignment-list –***

  ```
  { { ls-name, ...}  | ALL | COORDINATOR | SERVER | NONE | DEFAULT }
  ```

- ***ls-override-list –***

  ```
  { ls-name, ...}
  ```

- ***ls-name –***

  ```
  { OPEN | user-defined-ls-name }
  ```

- ***policy-option-value –***

  ```
  { UNLIMITED | DEFAULT | value }
  ```

Syntax 2

```
ALTER LOGIN POLICY policy-name
AUTO_UNLOCK_TIME=0 – UNLIMITED
| CHANGE_PASSWORD_DUAL_CONTROL=[ON | OFF]
| DEFAULT_LOGICAL_SERVER=[logical_server_name | ALL | AUTO | COORDINATOR |
NONE | OPEN | SERVER]
| LOCKED=[ON | OFF]
| MAX_CONNECTIONS=0 – 2147483647
| MAX_DAYS_SINCE_LOGIN=0 – 2147483647
| MAX_FAILED_LOGIN_ATTEMPTS=0 – 2147483647
| MAX_NON_DBA_CONNECTIONS=0 – 2147483647
| PASSWORD_EXPIRY_ON_NEXT_LOGIN=[ON | OFF]
| PASSWORD_GRACE_TIME=0 – 2147483647
| PASSWORD_LIFE_TIME=0 – 2147483647
| ROOT_AUTO_UNLOCK_TIME=0 – UNLIMITED
| LDAP_PRIMARY_SERVER=server_name
| LDAP_SECONDARY_SERVER=server_name
| LDAP_AUTO_FAILBACK_PERIOD=0 – 2147483647
| LDAP_FAILOVER_TO_STD=[ON | OFF]
| LDAP_REFRESH_DN=NOW
```

Applies to

Simplex and multiplex.

Examples

- **Example 1 –** see *Logical Server Access Configuration* and *Multiplex Login Policy Configuration* .
- **Example 2 –** sets the password_life_time value to `UNLIMITED` and the max_failed_login_attempts value to `5` in the `Test1` login policy.

```
ALTER LOGIN POLICY Test1
password_life_time=UNLIMITED
max_failed_login_attempts=5;
```

Permissions

Requires the MANAGE ANY LOGIN POLICY system privilege.

Login Policy Options

Available options for root and user-defined login policies.

Option	Description
AUTO_UNLOCK_TIME	The time period after which locked accounts not granted the MANAGE ANY USER system privilege are automatically unlocked. This option can be defined in any login policy, including the root login policy. • **Values –** 0 – unlimited • **Initial value for Root policy –** Unlimited • **Applies to –** All users not granted the MANAGE ANY USER system privilege.
CHANGE_PASSWORD_DUAL_CONTROL	Requires input from two users, each granted the CHANGE PASSWORD system privilege, to change the password of another user. • **Values –** ON, OFF • **Initial value for Root policy –** OFF • **Applies to –** All users.

Option	Description

DEFAULT_LOGICAL_SERVER	If the connection string specifies no logical server, the user connects to the `DEFAULT_LOGICAL_SERVER` setting specified in the user's login policy.
	• **Values –**
	  • Name of an existing user-defined logical server
	  • ALL – allows access to all logical servers.
	  • AUTO – value of the default logical server in the root login policy.
	  • COORDINATOR – the current coordinator node.
	  • NONE – denies access to any multiplex server.
	  • OPEN – use alone or with the name of a user-defined logical server. Allows access to all multiplex nodes that are not members of any user-defined logical servers.
	  • SERVER – allows access to all of the multiplex nodes, subject to the semantics of the SERVER logical server.
	• **Initial value for Root policy –** AUTO
	• **Applies to –** All users. Requires MANAGE MULTIPLEX system privilege.

LOCKED	If set ON, users cannot establish new connections. This setting temporarily denies access to login policy users. Logical server overrides for this option are not allowed. • **Values –** ON, OFF • **Initial value for Root policy –** OFF • **Applies to –** All users except those with the MANAGE ANY USER system privilege.
MAX_CONNECTIONS	The maximum number of concurrent connections allowed for a user. You can specify a per-logical-server setting for this option. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users except those with the SERVER OPERATOR or DROP CONNECTION system privilege.

Option	Description
MAX_DAYS_SINCE_LOGIN	The maximum number of days that can elapse between two successive logins by the same user. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users except those with the MANAGE ANY USER system privilege.
MAX_FAILED_LOGIN_ATTEMPTS	The maximum number of failed attempts, since the last successful attempt, to log into the user account before the account is locked. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users.
MAX_NON_DBA_CONNECTIONS	The maximum number of concurrent connections that a user without SERVER OPERATOR or DROP CONNECTION system privileges can make. This option is supported only in the root login policy. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users except those with the SERVER OPERATOR or DROP CONNECTION privilege.
PASSWORD_EXPIRY_ON_NEXT_LOGIN	If set ON, the user's password expires at the next login. • **Values –** ON, OFF • **Initial value for Root policy –** OFF • **Applies to –** All users. **Note:** This functionality is not currently implemented when logging in to Sybase Control Center. A user will not be prompted to change their password. He or she will be prompted, however, when logging in to SAP Sybase IQ outside of Sybase Control Center (for example, using Interactive SQL).
PASSWORD_GRACE_TIME	The number of days before password expiration during which login is allowed but the default post_login procedure issues warnings. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** 0 • **Applies to –** All users.

Option	Description
PASS-WORD_LIFE_TIME	The maximum number of days before a password must be changed. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users.
ROOT_AUTO_UN-LOCK_TIME	The time period after which locked accounts granted the MANAGE ANY USER system privilege are automatically unlocked. This option can be defined only in the root login policy. • **Values –** 0 – unlimited • **Initial value for Root policy –** 15 • **Applies to –** All users granted the MANAGE ANY USER system privilege.

LDAP Login Policy Options

Available login policy options for LDAP user authentication

Option	Description
LDAP_PRI-MARY_SERV-ER	Specifies the name of the primary LDAP server. • **Values –** n/a • **Initial value for Root policy –** None • **Applies to –** All users.
LDAP_SECON-DARY_SERV-ER	Specifies the name of the secondary LDAP server. • **Values –** n/a • **Initial value for ROOT policy –** None • **Applies to –** All users.
LDAP_AU-TO_FAIL-BACK_PERIOD	Specifies the time period, in minutes, after which automatic failback to the primary server is attempted. • **Values –** 0 - 2147483647 • **Initial value for ROOT policy –** 15 minutes • **Applies to –** All users.

Option	Description
LDAP_FAIL-OVER_TO_STD	Permits authentication with standard authentication when authentication with the LDAP server fails due to system resources, network outage, connection timeouts, or similar system failures. However, it does not permit an actual authentication failure returned from an LDAP server to fail over to standard authentication. • **Values –** ON, OFF • **Initial value for ROOT policy –** ON • **Applies to –** All users.
LDAP_RE-FRESH_DN	Updates the `ldap_refresh_dn` value in the `ISYSLOGINPOLICYOP-TION` system table with the current time, stored in Coordinated Universal Time (UTC). Each time a user authenticates with LDAP, if the value of the option `ldap_re-fresh_dn` in `ISYSLOGINPOLICYOPTION` is more recent than the `user_dn` value in `ISYSUSER`, a search for a new user DN occurs. The `user_dn` value is then updated with the new user DN and the `user_dn_changed_at` value is again updated to the current time. • **Values –** NOW • **Initial value for ROOT policy –** NULL • **Initial value for user-defined login policy –** Current time stored in UTC • **Applies to –** All users.

Multiplex Login Policy Configuration

Configure login policies for multiplex servers.

Example

This example overrides the login policy settings on a logical server, increasing the maximum number of connections on logical server `ls1`:

```
ALTER LOGIN POLICY lp1 max_connections=20 LOGICAL SERVER ls1;
```

Usage

Applies only to multiplex.

Any login management commands you execute on any multiplex server automatically propagate to all servers in the multiplex. For best performance, execute these commands, or any DDL, on the coordinator.

An override at the logical server level override means that a particular login policy option has different settings for different logical servers. `SYS.ISYSIQLSLOGINPOLICYOPTION` stores login policy option values for logical-server override. For each logical-server override

of a login policy option, a corresponding row exists in `ISYSIQLSLOGINPOLICYOPTION`.

Logical Server Access Configuration

Configure logical server access.

Example 1

Assume that the root login policy allows access to logical servers `ls4` and `ls5` and login policy `lp1` exists with no logical server assignment. The statement below effectively assigns login policy `lp1` to logical servers `ls4` and `ls5`.

Assign logical server `ls1` to login policy `lp1`:

```
ALTER LOGIN POLICY lp1 ADD LOGICAL SERVER ls1
```

Example 2

This statement allows access of logical servers `ls2` and `ls3` from login policy `lp1`:

```
ALTER LOGIN POLICY lp1 ADD LOGICAL SERVER ls2, ls3
```

Example 3

Modify login policy `lp1` to allow access to `ls3` and `ls4`only:

```
ALTER LOGIN POLICY lp1 ADD LOGICAL SERVER ls4
```

```
ALTER LOGIN POLICY lp1 DROP LOGICAL SERVER ls1, ls2
```

or:

```
ALTER LOGIN POLICY lp1 SET LOGICAL SERVER ls3, ls4
```

Example 4

Modify login policy`lp1` to deny access to any logical servers:

```
ALTER LOGIN POLICY lp1 SET LOGICAL SERVER NONE
```

Example 5

Drop current logical server assignments of login policy`lp1` and allow it to inherit the logical server assignments of the root login policy:

```
ALTER LOGIN POLICY lp1 SET LOGICAL SERVER DEFAULT
```

Usage

ADD, **DROP**, or **SET** clauses let you configure the logical server assignments of a login policy:

- **ADD** – adds new logical server assignments to a login policy.
- **DROP** – deletes existing logical server assignments from a login policy.
- **SET** – replaces all logical server assignments for a login policy with a new set of logical server.

Use only one **ADD**, **DROP**, or **SET** clause. Use **SERVER**, **NONE**, and **DEFAULT** only with the **SET** clause. Specify a particular logical server name only once per **ls-assignment list** or **ls-override list**.

An error is returned if:

- Any logical server specified with the **ADD** clause is already assigned to the login policy.
- Any logical server specified with the **DROP** clause is currently not assigned to the login policy.
- Logical server assignment change may cause a membership overlap among assigned logical servers.

`SYS.ISYSIQLOGINPOLICYLSINFO` stores logical server assignment information. For each logical-server override of a login policy option, a corresponding row exists in `ISYSIQLOGINPOLICYLSINFO`.

ALTER LS POLICY Statement

Modifies some or all option values for the root logical server policy or a user-created logical server policy.

Syntax

ALTER LS POLICY *policy-name option-value-list* [**WITH STOP SERVER**]

Parameters

- **option-value-list –** { *option-name* = *value* } ...
- **option-name –**

```
 ALLOW_COORDINATOR_AS_MEMBER = < ON | OFF >
| DQP_ENABLED = < 0 | 1 | 2 >
| LOGIN_REDIRECTION = < ON | OFF >
| REDIRECTION_WAITERS_THRESHOLD = < num >
| TEMP_DATA_IN_SHARED_TEMP = < ON | OFF >
```

Applies to

Multiplex only.

Examples

- **Example 1 –** alters the logical server policy:

```
ALTER LS POLICY root
ALLOW_COORDINATOR_AS_MEMBER=ON
```

- **Example 2 –** alters the logical server policy and causes servers to shut down automatically when the option value changes:

```
ALTER LS POLICY root
TEMP_DATA_IN_SHARED_TEMP=ON WITH STOP SERVER
```

Usage

The option values listed are modified for the new policy. Any unspecified option inherits its value from the root logical server policy.

Table 1. Logical Server Policy Options

Logical Server Policy Option	Allowed Values	Behavior
ALLOW_COORDINATOR_AS_MEMBER	ON, OFF	Can only be set for the ROOT logical server policy. When ON (the default), the coordinator can be a member of any user-defined logical server. OFF prevents the coordinator from being used as a member of any user-defined logical servers.
DQP_ENABLED	0, 1, 2	When set to 0, query processing is not distributed. When set to 1 (the default), query processing is distributed as long as a writable shared temporary file exists. When set to 2, query processing is distributed over the network, and the shared temporary store is not used.
LOGIN_REDIRECTION	ON, OFF	When ON, enables login redirection for logical servers governed by specified login policy. When OFF (the default), disables login redirection at the logical server level, allowing external connection management.
REDIRECTION_WAITERS_THRESHOLD	Integer	Specifies how many connections can queue before SAP Sybase IQ redirects a connection to this logical server to another server. Can be any integer value; default is 5.

Logical Server Policy Option	Allowed Values	Behavior
TEMP_DATA_IN_SHARED_TEMP	ON, OFF	When ON, all temporary table data and eligible scratch data writes to the shared temporary store, provided that the shared temporary store has at least one read-write file added. You must restart all multiplex nodes after setting this option or after adding a read-write file to the shared temporary store. (If the shared temporary store contains no read-write file, or if you do not restart nodes, data is written to IQ_SYSTEM_TEMP instead.) When OFF (the default), all temporary table data and scratch data writes to the local temporary store.

If you want a smaller IQ_SYSTEM_TEMP dbspace, turn `TEMP_DATA_IN_SHARED_TEMP` ON, which writes temporary data to IQ_SHARED_TEMP instead of IQ_SYSTEM_TEMP. In a distributed query processing environment, however, setting both `DQP_ENABLED` and `TEMP_DATA_IN_SHARED_TEMP` ON may saturate your SAN with additional data in IQ_SHARED_TEMP, where additional I/O operations against IQ_SHARED_TEMP may adversely affect DQP performance.

WITH STOP SERVER automatically shuts down all servers in the logical server when the `TEMP_DATA_IN_SHARED_TEMP` option is changed directly or indirectly.

This statement enforces consistent shared system temporary store settings across physical nodes shared by logical servers.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

ALTER MULTIPLEX RENAME Statement

Renames the multiplex and stores the multiplex name in SYS.ISYSIQINFO system table.

Syntax

```
ALTER MULTIPLEX RENAME multiplex-name
```

Applies to

Multiplex only.

Usage

When a multiplex is created, it is named after the coordinator. This statement is automatically committed.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

ALTER MULTIPLEX SERVER Statement

Changes the name, catalog file path, role, or status of the given server.

Syntax

Syntax 1:

```
ALTER MULTIPLEX SERVER server-name server-option
```

Syntax 2:

```
ALTER MULTIPLEX SERVER server-name PRIVATE NULL
```

Parameters

- **server-option –**

```
{ RENAME new-server-name
  | DATABASE 'dbfile'
  | ROLE { WRITER | READER | COORDINATOR }
  | STATUS { INCLUDED | EXCLUDED }
  | ASSIGN AS FAILOVER SERVER
  | host-port-list }
```

- **host-port-list –**

```
{ HOST ' hostname ' PORT port number ...}
{ PRIVATE HOST ' hostname ' PORT port number ...}
```

Note: Shut down the target server before you exclude it. If you do not, an excluded server automatically shuts down and requires **ALTER MULTIPLEX SERVER** *server-name* **STATUS INCLUDED** and a synchronize to rejoin the multiplex.

Applies to

Multiplex only.

Examples

- **Example –** excludes secondary server `mpx_writer1`:

```
ALTER MULTIPLEX SERVER mpx_writer1 STATUS EXCLUDED
```

Usage

Changes the multiplex server, as follows:

- **RENAME –** changes the name of the given server. The server automatically shuts down and the next restart requires the new name.
- **DATABASE –** changes the catalog file path for the given server. The server automatically shuts down and the next restart requires the new catalog path. The user must relocate the catalog file.
- **ROLE –** changes the role of the given server. Users cannot change the role of coordinator or role to coordinator. If the role of the writer node changes to reader, the server shuts down.
- **STATUS –** changes the status of the given server. A failover node cannot be excluded unless it is the last node to be excluded. The server automatically shuts down after exclusion. After including a node, you synchronize and restart it.
- **ASSIGN –** designates the given server as the new failover server. The node should not be in the excluded state. The ASSIGN AS FAILOVER clause is a standalone clause that cannot be used with any other **ALTER MULTIPLEX SERVER** clause.

  The coordinator must be running, but you can run the **ALTER MULTIPLEX SERVER** command from any server in the multiplex. (Run all DDL statements on the coordinator.) In all cases except when altering role from reader to writer, the named server is automatically shut down.

Note: Shut down the target server before you exclude it. If you do not, an excluded server automatically shuts down and requires `ALTER MULTIPLEX SERVER` *`server-name`* `STATUS INCLUDED` and a synchronize to rejoin the multiplex.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

ALTER PROCEDURE Statement

Replaces an existing procedure with a modified version. Include the entire modified procedure in the **ALTER PROCEDURE** statement, and reassign user permissions on the procedure.

Syntax

Syntax 1

```
ALTER PROCEDURE [ owner.]procedure-name procedure-definition
```

Syntax 2

```
ALTER PROCEDURE [ owner.]procedure-name
REPLICATE { ON | OFF }
```

Syntax 3

```
ALTER PROCEDURE [ owner.]procedure-name
SET HIDDEN
```

Syntax 4

```
ALTER PROCEDURE [ owner.]procedure-name
RECOMPILE
```

Syntax 5

```
ALTER PROCEDURE
[ owner.]procedure-name ( [ parameter, …] )
[ RESULT (result-column, ...)]
EXTERNAL NAME 'external-call' [ LANGUAGE environment-name ] }
```

Parameters

- **procedure-definition – CREATE PROCEDURE** syntax following the name
- **environment-name – JAVA [DISALLOW | ALLOW SERVER SIDE REQUESTS]**
- **external-call –** [*column-name*:]*function-name@library*, ...

Usage

The **ALTER PROCEDURE** statement must include the entire new procedure. You can use **PROC** as a synonym for **PROCEDURE**.

The **ALTER PROCEDURE** statement is identical in syntax to the **CREATE PROCEDURE** statement.

- **Syntax 1 –** The **ALTER PROCEDURE** statement is identical in syntax to the **CREATE PROCEDURE** statement except for the first word. Both Watcom and Transact-SQL dialect procedures can be altered through the use of **ALTER PROCEDURE**.

  With **ALTER PROCEDURE,** existing permissions on the procedure are not changed. If you execute **DROP PROCEDURE** followed by **CREATE PROCEDURE**, execute permissions are reassigned.
- **Syntax 2 –** If a procedure needs to be relocated to other sites using SAP Sybase Replication Server, set REPLICATE ON for the procedure.
- **Syntax 3 –** Use **SET HIDDEN** to obfuscate the definition of the associated procedure and cause it to become unreadable. The procedure can be unloaded and reloaded into other databases.

  Note: This setting is irreversible. It is recommended that you retain the original procedure definition outside of the database.

You cannot combine Syntax 2 with Syntax 1.

- **Syntax 4 –** Use the **RECOMPILE** syntax to recompile a stored procedure. When you recompile a procedure, the definition stored in the catalog is re-parsed and the syntax is verified. For procedures that generate a result set but do not include a **RESULT** clause, the database server attempts to determine the result set characteristics for the procedure and stores the information in the catalog. This can be useful if a table referenced by the procedure has been altered to add, remove, or rename columns since the procedure was created.

  The procedure definition is not changed by recompiling. You can recompile procedures with definitions hidden with the **SET HIDDEN** clause, but their definitions remain hidden.
- **Syntax 5 –** Use this syntax for Java UDFs.

  iq-environment-name: JAVA [DISALLOW | ALLOW SERVER SIDE REQUESTS]:

  DISALLOW is the default.

  ALLOW indicates that server-side connections are allowed.

  Note: Do not specify **ALLOW** unless necessary. A setting of **ALLOW** slows down certain types of SAP Sybase IQ table joins.

  Do not use UDFs with both **ALLOW SERVER SIDE REQUESTS** and **DISALLOW SERVER SIDE REQUESTS** in the same query.

When using the **ALTER PROCEDURE** statement for table UDFs, the same set of restrictions apply as for the ***CREATE PROCEDURE*** *Statement (External Procedures).*

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Alter a Watcom-SQL or Transcat-SQL procedure – Requires one of:

- ALTER ANY PROCEDURE system privilege.
- ALTER ANY OBJECT system privilege.
- You own the procedure.

Alter an external C/C++ or external environment procedure – Requires CREATE EXTERNAL REFERENCE system privilege. Also requires one of:

- ALTER ANY PROCEDURE system privilege.
- ALTER ANY OBJECT system privilege.
- You own the procedure.

See also

- *CREATE PROCEDURE Statement* on page 159

ALTER ROLE Statement

Migrates a compatibility role to a user-defined system role, then automatically drops the compatibility role.

Note: You cannot use the ALTER ROLE statement to migrate SYS_AUTH_REMOTE_DBA_ROLE, SYS_AUTH_SA_ROLE or SYS_AUTH_SSO_ROLE. SYS_AUTH_SA_ROLE and SYS_AUTH_SSO_ROLE are automatically migrated when SYS_AUTH_DBA_ROLE is migrated. SYS_AUTH_REMOTE_DBA_ROLE cannot be migrated at all.

Syntax

```
ALTER ROLE predefined_sys_role_name
MIGRATE TO new_role_name [, new_sa_role_name, new_sso_role_name]
```

Parameters

- **predefined_sys_role_name –** the name of a compatibility role that still exists (has not already been dropped) in the database.
- **new_role_name –** the name of the new role cannot begin with the prefix SYS_ or end with the suffix _ROLE.
- **new_sa_role_name –** required only when migrating SYS_AUTH_DBA_ROLE. The new role to which the underlying system privileges of SYS_AUTH_SA_ROLE are to be migrated to cannot already exist in the database, and the new role name cannot begin with the prefix SYS_ or end with the suffix _ROLE.
- **new_sso_role_name –** required only when migrating SYS_AUTH_DBA_ROLE. The new role to which the underlying system privileges of SYS_AUTH_SSO_ROLE are to be migrated to cannot already exist in the database, and the new role name cannot begin with the prefix SYS_ or end with the suffix _ROLE.

Examples

- **Example 1 –** this statement migrates SYS_AUTH_DBA_ROLE to the new roles `Custom_DBA`, `Custom_SA`, and `Custom_SSO` respectively. It then automatically migrates all users, underlying system privileges, and roles granted to SYS_AUTH_DBA_ROLE to the applicable new roles. Finally, it drops SYS_AUTH_DBA_ROLE, SYS_AUTH_SA_ROLE, and SYS_AUTH_SSO_ROLE.

  ```
  ALTER ROLE SYS_AUTH_DBA_ROLE
  MIGRATE TO Custom_DBA, Custom_SA, Custom_SSO
  ```

- **Example 2 –** this statement migrates SYS_AUTH_OPERATOR_ROLE role to the new role `Operator_role`. It then automatically migrates all users, underlying system

privileges, and roles granted to SYS_AUTH_OPERATOR_ROLE to the new role and drops SYS_AUTH_OPERATOR_ROLE.

```
ALTER ROLE SYS_AUTH_OPERATOR_ROLE
MIGRATE TO Operator_role
```

Usage

During the migration process:

- A new user-defined role is created.
- All of the system privileges currently granted to the migrating predefined role are automatically granted to the new user-defined role.
- All users and roles currently granted to the migrating predefined role are automatically granted to the new user-defined role.
- The compatibility role is dropped.

Since no role administrator was specified during the migration process, only global role administrators can manage the new role. Use the CREATE ROLE statement to add role administrators with appropriate administrative rights to the role.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ROLES system privilege granted with administrative rights.

ALTER SEQUENCE statement

Alters a sequence. This statement applies to SAP Sybase IQ catalog store tables only.

Syntax

```
ALTER SEQUENCE  [ owner.] sequence-name
[ RESTART WITH signed-integer ]
[ INCREMENT BY signed-integer ]
[ MINVALUE signed-integer  |  NO MINVALUE  ]
[ MAXVALUE signed-integer  |  NO MAXVALUE  ]
[ CACHE integer  |  NO CACHE  ]
[ CYCLE  |  NO CYCLE ]
```

Parameters

RESTART WITH clause – Restarts the named sequence with the specified value.

INCREMENT BY clause – Defines the amount the next sequence value is incremented from the last value assigned. The default is 1. Specify a negative value to generate a descending sequence. An error is returned if the INCREMENT BY value is 0.

MINVALUE clause – Defines the smallest value generated by the sequence. The default is 1. An error is returned if MINVALUE is greater than (2^63-1) or less than -(2^63-1). An error is also returned if MINVALUE is greater than MAXVALUE.

MAXVALUE clause – Defines the largest value generated by the sequence. The default is 2^63-1. An error is returned if MAXVALUE is greater than 2^63-1 or less than -(2^63-1).

CACHE clause – Specifies the number of preallocated sequence values that are kept in memory for faster access. When the cache is exhausted, the sequence cache is repopulated and a corresponding entry is written to the transaction log. At checkpoint time, the current value of the cache is forwarded to the ISYSSEQUENCE system table. The default is 100.

CYCLE clause – Specifies whether values should continue to be generated after the maximum or minimum value is reached.

Remarks

If the named sequence cannot be located, an error message is returned.

Privileges

You must be the owner of the sequence, or have one of the following privileges:

ALTER ANY SEQUENCE system privilege
ALTER ANY OBJECT system privilege

Side effects

None

Standards and compatibility

- **SQL/2008 –** The ALTER SEQUENCE statement is part of optional SQL language feature T176 of the SQL/2008 standard. The CACHE clause is a vendor extension.

Example

The following example sets a new maximum value for a sequence named Test:

```
ALTER SEQUENCE Test
   MAXVALUE 1500;
```

ALTER SERVER Statement

Modifies the attributes of a remote server.

Syntax

```
ALTER SERVER server-name
[ CLASS 'server-class' ]
[ USING 'connection-info' ]
[ CAPABILITY 'cap-name' { ON | OFF } ]
[ CONNECTION CLOSE [ CURRENT | ALL | connection-id ] ]
```

Parameters

- **server-class –** { *ASAJDBC* | *ASEJDBC* | *SAODBC* | *ASEODBC* | *DB2ODBC* | *MSSODBC* | *ORAODBC* | *ODBC* }
- **connection-info –** { *machine-name:port-number* [/*dbname*] | *data-source-name* }
- **cap-name –** the name of a server capability

Examples

- **Example 1 –** Changes the server class of the Adaptive Server Enterprise server named `ase_prod` so its connection to SAP Sybase IQ is ODBC-based. The Data Source Name is `ase_prod`.

  ```
  ALTER SERVER ase_prod
  CLASS 'ASEODBC'
  USING 'ase_prod'
  ```

- **Example 2 –** Changes a capability of server `infodc`:

  ```
  ALTER SERVER infodc
  CAPABILITY 'insert select' OFF
  ```

- **Example 3 –** Closes all connections to the remote server named `rem_test`:

  ```
  ALTER SERVER rem_test
  CONNECTION CLOSE ALL
  ```

- **Example 4 –** Closes the connection to the remote server named `rem_test` that has the connection ID 142536:

  ```
  ALTER SERVER rem_test
  CONNECTION CLOSE 142536
  ```

Usage

Changes made by **ALTER SERVER** do not take effect until the next connection to the remote server.

- **CLASS clause –** use the **CLASS** clause to change the server class. For more information on server classes.
- **USING clause –** the **USING** clause changes the server's connection information. For more information about connection information, see *CREATE SERVER Statement.*
- **CAPABILITY clause –** the **CAPABILITY** clause turns a server capability ON or OFF. Server capabilities are stored in the system table `SYSCAPABILITY`. The names of these capabilities are stored in the system table `SYSCAPABILITYNAME`. The `SYSCAPABILITY` table contains no entries for a remote server until the first connection is made to that server. At the first connection, SAP Sybase IQ interrogates the server about its capabilities and then populates `SYSCAPABILITY`. For subsequent connections, the server's capabilities are obtained from this table.

  In general, you need not alter a server's capabilities. It might be necessary to alter capabilities of a generic server of class ODBC.
- **CONNECTION CLOSE clause –** when a user creates a connection to a remote server, the remote connection is not closed until the user disconnects from the local database. The CONNECTION CLOSE clause allows you to explicitly close connections to a remote server. You may find this useful when a remote connection becomes inactive or is no longer needed.

  These SQL statements are equivalent and close the current connection to the remote server:

  ```
  ALTER SERVER server-name CONNECTION CLOSE
  ```

  ```
  ALTER SERVER server-name CONNECTION CLOSE CURRENT
  ```

  You can close both ODBC and JDBC connections to a remote server using this syntax. You do not need the SERVER OPERATOR system privilege to execute either of these statements.

  You can also disconnect a specific remote ODBC connection by specifying a connection ID, or disconnect all remote ODBC connections by specifying the ALL keyword. If you attempt to close a JDBC connection by specifying the connection ID or the ALL keyword, an error occurs. When the connection identified by *connection-id* is not the current local connection, the user must have the SERVER OPERATOR system privilege to be able to close the connection.

Side effects:

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Open Client/Open Server.

Permissions

Requires the SERVER OPERATOR system privilege.

See also

- *CREATE SERVER Statement* on page 184
- *DROP SERVER Statement* on page 261

ALTER SERVICE Statement

Alters a Web service.

Syntax

```
ALTER SERVICE service-name
[ TYPE 'service-type-string' ]
[ attributes ]
[ AS statement' ]
```

Parameters

- **attributes –**

```
[ AUTHORIZATION { ON | OFF } ]
 [ SECURE { ON | OFF } ]
 [ USER user-name | NULL } ]
 [ URL [ PATH ] { PATH ] { ON | OFF | ELEMENTS } ]
 [ USING ( SOAP-prefix | NULL } ]
```

- ***service-type-string* –**

```
{ 'RAW' | 'HTML' | 'XML' | 'SOAP' | 'DISH' }
```

Examples

- **Example 1 –** To set up a Web server quickly, start a database server with the **-xs** switch, then execute these statements:

```
CREATE SERVICE tables TYPE 'HTML'
```

```
ALTER SERVICE tables
AUTHORIZATION OFF
USER DBA
AS SELECT * FROM SYS.ISYSTAB
```

  After executing these statements, use any Web browser to open the URL http://localhost/tables.

Usage

The **ALTER SERVICE** statement causes the database server to act as a Web server.

- **service-name –** you cannot rename Web services.
- **service-type-string –** identifies the type of the service. The type must be one of the listed service types. There is no default value.
- **AUTHORIZATION clause –** determines whether users must specify a user name and password when connecting to the service. If authorization is OFF, the AS clause is required and a single user must be identified by the **USER** clause. All requests are run using that user's account and permissions.

  If authorization is ON, all users must provide a user name and password. Optionally, you might limit the users that are permitted to use the service by providing a user or role name using the **USER** clause. If the user name is NULL, all known users can access the service.

  The default value is ON. It is recommended that production systems be run with authorization turned on and that you grant permission to use the service by adding users to a role.
- **SECURE clause –** indicates whether unsecure connections are accepted. ON indicates that only HTTPS connections are to be accepted. Service requests received on the HTTP port are automatically redirected to the HTTPS port. If set to OFF, both HTTP and HTTPS connections are accepted. The default value is OFF.
- **USER clause –** if authorization is disabled, this parameter becomes mandatory and specifies the user id used to execute all service requests. If authorization is enabled (the default), this optional clause identified the user or role permitted access to the service. The default value is NULL, which grants access to all users.
- **URL clause –** determines whether URI paths are accepted and, if so, how they are processed. OFF indicates that nothing must follow the service name in a URI request. ON indicates that the remainder of the URI is interpreted as the value of a variable named url. ELEMENTS indicates that the remainder of the URI path is to be split at the slash characters into a list of up to 10 elements. The values are assigned to variables named url plus a numeric suffix of between 1 and 10; for example, the first three variable names are url1, url2, and url3. If fewer than 10 values are supplied, the remaining variables are set to NULL. If the service name ends with the character /, then URL must be set to OFF. The default value is OFF.
- **USING clause –** this clause applies only to DISH services. The parameter specifies a name prefix. Only SOAP services whose names begin with this prefix are handled.
- **statement –** if the statement is NULL, the URI must specify the statement to be executed. Otherwise, the specified SQL statement is the only one that can be executed through the service. SOAP services must have statements; DISH services must have none. The default value is NULL.

  It is strongly recommended that all services run in production systems define a statement. The statement can be NULL only if authorization is enabled.
- **RAW –** the result set is sent to the client without any further formatting. You can produce formatted documents by generating the required tags explicitly within your procedure.

- **HTML –** the result set of a statement or procedure is automatically formatted into an HTML document that contains a table.
- **XML –** the result set is assumed to be in XML format. If it is not already so, it is automatically converted to XML RAW format.
- **SOAP –** the request must be a valid Simple Object Access Protocol, or SOAP, request. The result set is automatically formatted as a SOAP response. For more information about the SOAP standards, see *www.w3.org/TR/SOAP*.
- **DISH –** a Determine SOAP Handler, or DISH, service acts as a proxy for one or more SOAP services. In use, it acts as a container that holds and provides access to a number of SOAP services. A Web Services Description Language (WSDL) file is automatically generated for each of the included SOAP services. The included SOAP services are identified by a common prefix, which must be specified in the **USING** clause.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY WEB SERVICE system privilege.

See also

- *CREATE SERVICE Statement* on page 186
- *DROP SERVICE Statement* on page 262

ALTER SPATIAL REFERENCE SYSTEM Statement

Changes the settings of an existing spatial reference system. See the Remarks section for considerations before altering a spatial reference system

Syntax

```
ALTER SPATIAL REFERENCE SYSTEM
    srs-name
    [ srs-attribute [ srs-attribute ... ] ]

srs-name : string

srs-attribute :
    SRID srs-id
    | DEFINITION { definition-string | NULL }
    | ORGANIZATION { organization-name IDENTIFIED BY organization-srs-id
| NULL }
    | TRANSFORM DEFINITION { transform-definition-string | NULL }
    | LINEAR UNIT OF MEASURE linear-unit-name
    | ANGULAR UNIT OF MEASURE { angular-unit-name | NULL }
```

```
    | TYPE { ROUND EARTH | PLANAR }
    | COORDINATE coordinate-name { UNBOUNDED | BETWEEN low-number
AND high-number }
    | ELLIPSOID SEMI MAJOR AXIS semi-major-axis-length { SEMI MINOR AXIS
semi-minor-axis-length
    | INVERSE FLATTENING inverse-flattening-ratio }
    | SNAP TO GRID { grid-size | DEFAULT }
    | TOLERANCE { tolerance-distance | DEFAULT }
    | POLYGON FORMAT polygon-format
    | STORAGE FORMAT storage-format

srs-id: integer
semi-major-axis-length : number
semi-minor-axis-length : number
inverse-flattening-ratio : number
grid-size : DOUBLE : usually between 0 and 1
tolerance-distance : number
axis-order : { 'x/y/z/m' | 'long/lat/z/m' | 'lat/long/z/m' }
polygon-format : { 'CounterClockWise' | 'Clockwise' | 'EvenOdd' }
storage-format : { 'Internal' | 'Original' | 'Mixed' }
```

Parameters

Complete definitions for each of the clauses is provided in the CREATE SPATIAL REFERENCE SYSTEM statement.

- **IDENTIFIED BY clause –** Use this clause to change the SRID number for the spatial reference system.
- **DEFINITION clause –** Use this clause to set, or override, default coordinate system settings.
- **ORGANIZATION clause –** Use this clause to specify information about the organization that created the spatial reference system that the spatial reference system is based on.
- **TRANSFORM DEFINITION clause –** Use this clause to specify a description of the transform to use for the spatial reference system. Currently, only the PROJ.4 transform is supported. The transform definition is used by the ST_Transform method when transforming data between spatial reference systems. Some transforms may still be possible even if there is no transform-definition-string defined.
- **COORDINATE clause –** Use this clause to specify the bounds on the spatial reference system's dimensions. coordinate-name is the name of the coordinate system used by the spatial reference system. For non-geographic types coordinate-name can be x, y, or m. For geographic types, coordinate-name can be LATITUDE, LONGITUDE, z, or m.
- **LINEAR UNIT OF MEASURE clause –** Use this clause to specify the linear unit of measure for the spatial reference system. The value you specify must match a linear unit of measure defined in the ST_UNITS_OF_MEASURE system view.
- **ANGULAR UNIT OF MEASURE clause –** Use this clause to specify the angular unit of measure for the spatial reference system. The value you specify must match an angular unit of measure defined in the ST_UNITS_OF_MEASURE system table.
- **TYPE clause –** Use the TYPE clause to control how the spatial reference system interprets lines between points. For geographic spatial reference systems, the TYPE clause can

specify either ROUND EARTH (the default) or PLANAR. For non-geographic spatial reference systems, the type must be PLANAR.

- **ELLIPSOID clause –** Use the ellipsoid clause to specify the values to use for representing the Earth as an ellipsoid for spatial reference systems of type ROUND EARTH. If the DEFINITION clause is present, it can specify ellipsoid definition. If the ELLIPSOID clause is specified, it overrides this default ellipsoid.
- **SNAP TO GRID clause –** For flat-Earth (planar) spatial reference systems, use the SNAP TO GRID clause to define the size of the grid SQL Anywhere uses when performing calculations. Specify SNAP TO GRID DEFAULT to set the grid size to the default that the database server would use.

  For round-Earth spatial reference systems, SNAP TO GRID must be set to 0.
- **TOLERANCE clause –** For flat-Earth (planar) spatial reference systems, use the TOLERANCE clause to specify the precision to use when comparing points.

  For round-Earth spatial reference systems, TOLERANCE must be set to 0.
- **POLYGON FORMAT clause –** Use the POLYGON FORMAT clause to change the polygon interpretation. The following values are supported:

  - 'CounterClockwise'
  - 'Clockwise'
  - 'EvenOdd'

  The default polygon format is 'EvenOdd'.
- **STORAGE FORMAT clause –** Use the STORAGE FORMAT clause to control what is stored when spatial data is loaded into the database. Possible values are:

  - **'Internal'** SQL Anywhere stores only the normalized representation. Specify this when the original input characteristics do not need to be reproduced. This is the default for planar spatial reference systems (TYPE PLANAR).

    Note: If you are using MobiLink to synchronize your spatial data, you should specify Mixed instead. MobiLink tests for equality during synchronization, which requires the data in its original format.
  - **'Original'** SQL Anywhere stores only the original representation. The original input characteristics can be reproduced, but all operations on the stored values must repeat normalization steps, possibly slowing down operations on the data.
  - **'Mixed'** SQL Anywhere stores the internal version and, if it is different from the original version, SQL Anywhere stores the original version as well. By storing both versions, the original representation characteristics can be reproduced and operations on stored values do not need to repeat normalization steps. However, storage requirements may increase significantly because potentially two representations are being stored for each geometry.

    Mixed is the default format for round-Earth spatial reference systems (TYPE ROUND EARTH).

Examples

- **Example –** The following example changes the polygon format of a fictitious spatial reference system named mySpatialRef to EvenOdd.

```
ALTER SPATIAL REFERENCE SYSTEM mySpatialRef
POLYGON FORMAT 'EvenOdd';
```

Usage

You cannot alter a spatial reference system if there is existing data that references it. For example, if you have a column declared as ST_Point(SRID=8743), you cannot alter the spatial reference system with SRID 8743. This is because many spatial reference system attributes, such as storage format, impact the storage format of the data. If you have data that references the SRID, create a new spatial reference system and transform the data to the new SRID.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- You are the owner of the spatial reference system.
- ALTER privilege on the spatial reference system
- MANAGE ANY SPATIAL OBJECT system privilege
- ALTER ANY OBJECT system privilege.

ALTER TABLE Statement

Modifies a table definition.

Syntax

Syntax 1

```
ALTER TABLE [ owner.]table-name
|{ ENABLE | DISABLE } RLV STORE
{ alter-clause, ... }
```

Syntax 2

```
ALTER TABLE table_name ALTER OWNER TO new_owner
    [ { PRESERVE | DROP } PERMISSIONS ]
    [ { PRESERVE | DROP } FOREIGN KEYS ]
```

Parameters

- **alter-clause –**

```
ADD create-clause
    | ALTER column-name column-alteration
    | ALTER [ CONSTRAINT constraint-name ] CHECK ( condition )
    | DROP drop-object
    | RENAME rename-object
    | move-clause
    | SPLIT PARTITION range-partition-name
        INTO( range-partition-decl-1, range-partition-decl-2
    | SPLIT SUBPARTITION range-subpartition-name
        INTO ( subrange-partition-decl-1, subrange-partition-
decl-2 )
    | MERGE PARTITION partition-name-1 INTO partition-name-2
    | MERGE SUBPARTITION subrange-partition-name-1 INTO subrange-
partition-name-2
    | UNPARTITION
    | PARTITION BY
       range-partitioning-scheme
         | hash-partitioning-scheme
         | composite-partitioning-scheme
```

- **create-clause –**

```
column-name column-definition [ column-constraint ]
    | table-constraint
    | [ PARTITION BY | SUBPARTITION BY ] range-partitioning-scheme
```

- **column-definition –**

```
 column-name data-type [ NOT NULL | NULL  ]
    [ IN dbspace-name ]
    [ DEFAULT default-value | IDENTITY ]
```

- **column-constraint –**

```
[ CONSTRAINT constraint-name ]
   { UNIQUE
     | PRIMARY KEY
     | REFERENCES table-name [ (column-name ) ] [ actions ]
     | CHECK ( condition )
     | IQ UNIQUE ( integer )
   }
```

- **table-constraint –**

```
[ CONSTRAINT constraint-name ]
    { UNIQUE ( column-name [ , … ] )
      | PRIMARY KEY ( column-name [ , … ] )
      | foreign-key-constraint
      | CHECK ( condition )
   }
```

- **foreign-key-constraint –**

```
FOREIGN KEY [ role-name ] [ ( column-name [ , … ] ) ]
   ... REFERENCES table-name [ ( column-name [ , … ] ) ]
   ... [ actions ]
```

- **actions –**

```
[ ON   { UPDATE | DELETE }    { RESTRICT } ]
```

- **column-alteration –**

```
{ column-data-type | alterable-column-attribute } [ alterable-column-attribute ... ]

    | ADD [ constraint-name ] CHECK ( condition )
    | DROP { DEFAULT | CHECK | CONSTRAINT constraint-name }
```

- **alterable-column-attribute –**

```
[ NOT ] NULL
   | DEFAULT default-value
   | [ CONSTRAINT constraint-name ] CHECK { NULL |( condition )
     }
```

- **default-value –**

```
CURRENT { DATABASE |DATE |REMOTE USER |TIME |TIMESTAMP | USER |
PUBLISHER )
   | string
   | global variable
   | [ - ] number
   | ( constant-expression )
   | built-in-function ( constant-expression )
   | AUTOINCREMENT
   | NULL
   | TIMESTAMP
   | LAST USER
   | USER
```

- **drop-object –**

```
{ column-name
   | CHECK constraint-name
   | CONSTRAINT
   | UNIQUE ( index-columns-list )
   | PRIMARY KEY
   | FOREIGN KEY fkey-name
   | [  PARTITION | SUBPARTITION  ] range-partition-name
  }
```

- **rename-object –**

```
new-table-name
    | column-name TO new-column-name
    | CONSTRAINT constraint-name TO new-constraint-name
   | [ PARTITION | SUBPARTITION ] range-partition-name TO new-range-
partition-name
```

- **move-clause –**

```
{ ALTER column-name
        MOVE
        { PARTITION ( range-partition-name TO new-dbspace-name)
          | SUBPARTITION ( range-partition-name TO new-dbspace-name
            |  TO new-dbspace-name }
         }
        | MOVE PARTITION range-partition-name TO new-dbspace-name
       | MOVE SUBPARTITION range-partition-name TO new-dbspace-name
```

```
        | MOVE TO new-dbspace-name
        | MOVE METADATA TO new-dbspace-name
  }
```

- **range-partitioning-scheme –**

```
RANGE ( partition-key )
    ( range-partition-decl [,range-partition-decl ...] )
```

- **hash-partitioning-scheme –**

```
HASH ( partition-key [, partition-key,...] )
```

- **composite-partitioning-schem: –**

```
hash-partitioning scheme SUBPARTITION range-partitioning-scheme
```

- **partition-key –**

```
column-name
```

- **range-partition-decl –**

```
range-partition-name VALUES <= ( {constant | MAX } ) [ IN dbspace-
name ]
```

Examples

- **Example 1 –** Add a new column to the `Employees` table showing which office they work in:

```
ALTER TABLE Employees
ADD office CHAR(20)
```

- **Example 2 –** Drop the `office` column from the `Employees` table:

```
ALTER TABLE Employees
DROP office
```

- **Example 3 –** Add a column to the `Customers` table assigning each customer a sales contact:

```
ALTER TABLE Customers
ADD SalesContact INTEGER
REFERENCES Employees (EmployeeID)
```

- **Example 4 –** Add a new column `CustomerNum` to the `Customers` table and assigns a default value of 88:

```
ALTER TABLE Customers
ADD CustomerNum INTEGER DEFAULT 88
```

- **Example 5 –** Only **FP** indexes for `c2`, `c4`, and `c5`, are moved from dbspace `Dsp3` to `Dsp6`. **FP** index for `c1` remains in `Dsp1`. **FP** index for `c3` remains in `Dsp2`. The primary key for `c5` remains in `Dsp4`. **DATE** index `c4_date` remains in `Dsp5`.

```
CREATE TABLE foo (
        c1 INT IN Dsp1,
        c2 VARCHAR(20),
```

```
        c3 CLOB IN Dsp2,
        c4 DATE,
        c5 BIGINT,
        PRIMARY KEY (c5) IN Dsp4) IN Dsp3);

    CREATE DATE INDEX c4_date ON foo(c4) IN Dsp5;
    ALTER TABLE foo
        MOVE TO Dsp6;
```

- **Example 6 –** Move only **FP** index `c1` from dbspace `Dsp1` to `Dsp7`:

```
ALTER TABLE foo ALTER c1 MOVE TO Dsp7
```

- **Example 7 –** This example illustrates the use of many **ALTER TABLE** clauses to move, split, rename, and merge partitions.

  Create a partitioned table:

```
CREATE TABLE bar (
        c1 INT,
        c2 DATE,
        c3 VARCHAR(10))
    PARTITION BY RANGE(c2)
    (p1 VALUES <= ('2005-12-31') IN dbsp1,
     p2 VALUES <= ('2006-12-31') IN dbsp2,
     P3 VALUES <= ('2007-12-31') IN dbsp3,
     P4 VALUES <= ('2008-12-31') IN dbsp4);

    INSERT INTO bar VALUES(3, '2007-01-01', 'banana nut');
    INSERT INTO BAR VALUES(4, '2007-09-09', 'grape jam');
    INSERT INTO BAR VALUES(5, '2008-05-05', 'apple cake');
```

  Move partition `p2` to `dbsp5`:

```
ALTER TABLE bar MOVE PARTITION p2 TO DBSP5;
```

  Split partition `p4` into 2 partitions:

```
ALTER TABLE bar SPLIT PARTITION p4 INTO
        (P41 VALUES <= ('2008-06-30') IN dbsp4,
         P42 VALUES <= ('2008-12-31') IN dbsp4);
```

  This **SPLIT PARTITION** reports an error, as it requires data movement. Not all existing rows are in the same partition after split.

```
ALTER TABLE bar SPLIT PARTITION p3 INTO
        (P31 VALUES <= ('2007-06-30') IN dbsp3,
         P32 VALUES <= ('2007-12-31') IN dbsp3);
```

  This error is reported:

```
No data move is allowed, cannot split partition p3.
```

  This **SPLIT PARTITION** reports an error, because it changes the partition boundary value:

```
ALTER TABLE bar SPLIT PARTITION p2 INTO
        (p21 VALUES <= ('2006-06-30') IN dbsp2,
         P22 VALUES <= ('2006-12-01') IN dbsp2);
```

This error is reported:

```
Boundary value for the partition p2 cannot be changed.
```

Merge partition `p3` into `p2`. An error is reported as a merge from a higher boundary value partition into a lower boundary value partition is not allowed.

```
ALTER TABLE bar MERGE PARTITION p3 into p2;
```

This error is reported:

```
Partition 'p2' is not adjacent to or before partition 'p3'.
```

Merge partition `p2` into `p3`:

```
ALTER TABLE bar MERGE PARTITION p2 INTO P3;
```

Rename partition `p1` to `p1_new`:

```
ALTER TABLE bar RENAME PARTITION p1 TO p1_new;
```

Unpartition table `bar`:

```
ALTER TABLE bar UNPARTITION;
```

Partition table `bar`. This command reports an error, because all rows must be in the first partition.

```
ALTER TABLE bar PARTITION BY RANGE(c2)
    (p1 VALUES <= ('2005-12-31') IN dbsp1,
     P2 VALUES <= ('2006-12-31') IN DBSP2,
     P3 VALUES <= ('2007-12-31') IN dbsp3,
     P4 VALUES <= ('2008-12-31') IN dbsp4);
```

This error is reported:

```
All rows must be in the first partition.
```

Partition table `bar`:

```
ALTER TABLE bar PARTITION BY RANGE(c2)
    (p1 VALUES <= ('2008-12-31') IN dbsp1,
     P2 VALUES <= ('2009-12-31') IN dbsp2,
     P3 VALUES <= ('2010-12-31') IN dbsp3,
     P4 VALUES <= ('2011-12-31') IN dbsp4);
```

- **Example 8 –** Change a table `tab1` so that it is no longer registered for in-memory real-time updates in the RLV store.

```
ALTER TABLE tab1 DISABLE RLV STORE
```

Usage

The `ALTER TABLE` statement changes table attributes (column definitions and constraints) in a table that was previously created. The syntax allows a list of alter clauses; however, only one table constraint or column constraint can be added, modified, or deleted in each ALTER TABLE statement. ALTER TABLE is prevented whenever the statement affects a table that is

currently being used by another connection. ALTER TABLE can be time consuming, and the server does not process requests referencing the same table while the statement is being processed.

Note: You cannot alter local temporary tables, but you can alter global temporary tables when they are in use by only one connection.

SAP Sybase IQ enforces `REFERENCES` and `CHECK` constraints. Table and/or column check constraints added in an ALTER TABLE statement are evaluated, only if they are defined on one of the new columns added, as part of that alter table operation. For details about `CHECK` constraints, see *CREATE TABLE Statement*.

If `SELECT *` is used in a view definition and you alter a table referenced by the `SELECT *`, then you must run `ALTER VIEW <viewname> RECOMPILE` to ensure that the view definition is correct and to prevent unexpected results when querying the view.

ADD column-definition [**column-constraint**] — Add a new column to the table.

- The table must be empty to specify `NOT NULL`. The table might contain data when you add an `IDENTITY` or `DEFAULT AUTOINCREMENT` column. If the column has a default `IDENTITY` value, all rows of the new column are populated with sequential values. You can also add `FOREIGN` constraint as a column constraint for a single column key. The value of the `IDENTITY/DEFAULT AUTOINCREMENT` column uniquely identifies every row in a table.
- The `IDENTITY/DEFAULT AUTOINCREMENT` column stores sequential numbers that are automatically generated during inserts and updates. `DEFAULT AUTOINCREMENT` columns are also known as `IDENTITY` columns. When using `IDENTITY/DEFAULT AUTOINCREMENT`, the column must be one of the integer data types, or an exact numeric type, with scale 0. See *CREATE TABLE Statement* for more about column constraints and `IDENTITY/DEFAULT AUTOINCREMENT` columns.
- **IQ UNIQUE** constraint — Defines the expected cardinality of a column and determines whether the column loads as `Flat FP` or `NBit FP`. An `IQ UNIQUE(`*n*`)` value explicitly set to 0 loads the column as `Flat FP`. Columns without an `IQ UNIQUE` constraint implicitly load as `NBit` up to the limits defined by the `FP_NBIT_AUTOSIZE_LIMIT`, `FP_NBIT_LOOKUP_MB`, and `FP_NBIT_ROLLOVER_MAX_MB` options:
  - `FP_NBIT_AUTOSIZE_LIMIT` limits the number of distinct values that load as `NBit`
  - `FP_NBIT_LOOKUP_MB` sets a threshold for the total `NBit` dictionary size
  - `FP_NBIT_ROLLOVER_MAX_MB` sets the dictionary size for implicit `NBit` rollovers from `NBit` to `Flat FP`
  - `FP_NBIT_ENFORCE_LIMITS` enforces `NBit` dictionary sizing limits. This option is OFF by default

  Using `IQ UNIQUE` with an *n* value less than the `FP_NBIT_AUTOSIZE_LIMIT` is not necessary. Auto-size functionality automatically sizes all low or medium cardinality

columns as NBit. Use IQ UNIQUE in cases where you want to load the column as Flat FP or when you want to load a column as NBit when the number of distinct values exceeds the FP_NBIT_AUTOSIZE_LIMIT.

Note:

- Consider memory usage when specifying high IQ UNIQUE values. If machine resources are limited, avoid loads with FP_NBIT_ENFORCE_LIMITS='OFF' (default).
  Prior to SAP Sybase IQ 16.0, an IQ UNIQUE *n* value > 16777216 would rollover to Flat FP. In 16.0, larger IQ UNIQUE values are supported for tokenization, but may require significant memory resource requirements depending on cardinality and column width.
- BIT, BLOB,and CLOB data types do not support NBit dictionary compression. If FP_NBIT_IQ15_COMPATIBILITY='OFF', a non-zero IQ UNIQUE column specification in a CREATE TABLE or ALTER TABLE statement that includes these data types returns an error.

{ ENABLE | DISABLE } RLV STORE — Registers this table with the RLV store for real-time in-memory updates. This value overrides the value of the database option **BASE_TABLES_IN_RLV**. Requires the CREATE TABLE system privilege and CREATE permissions on the RLV store dbspace to set this value to ENABLE.

Note: The { ENABLE | DISABLE } RLV STORE clause is not supported for IQ temporary tables.

ALTER *column-name* **column-alteration** — Change the column definition:

- **SET DEFAULT** *default-value* — Change the default value of an existing column in a table. You can also use the MODIFY clause for this task, but ALTER is ISO/ANSI SQL compliant, and MODIFY is not. Modifying a default value does not change any existing values in the table.
- **DROP DEFAULT** — Remove the default value of an existing column in a table. You can also use the MODIFY clause for this task, but ALTER is ISO/ANSI SQL compliant, and MODIFY is not. Dropping a default does not change any existing values in the table.
- **ADD** — Add a named constraint or a CHECK condition to the column. The new constraint or condition applies only to operations on the table after its definition. The existing values in the table are not validated to confirm that they satisfy the new constraint or condition.
- **CONSTRAINT** *column-constraint-name* — The optional column constraint name lets you modify or drop individual constraints at a later time, rather than having to modify the entire column constraint.
- [**CONSTRAINT** *constraint-name*] **CHECK** (*condition*) — Use this clause to add a CHECK constraint on the column.

- **SET COMPUTE** (*expression*) — Change the expression associated with a computed column. The values in the column are recalculated when the statement is executed, and the statement fails if the new expression is invalid.
- **DROP COMPUTE** — Change a column from being a computed column to being a non-computed column. This statement does not change any existing values in the table.

ADD table-constraint — Add a constraint to the table.

You can also add a foreign key constraint as a table constraint for a single-column or multicolumn key. If `PRIMARY KEY` is specified, the table must not already have a primary key created by the `CREATE TABLE` statement or another `ALTER TABLE statement`. See *CREATE TABLE Statement* for a full explanation of table constraints.

Note: You cannot MODIFY a table or column constraint. To change a constraint, DELETE the old constraint and ADD the new constraint.

DROP *drop-object* — Drops a table object.

- **DROP** *column-name* — Drop the column from the table. If the column is contained in any multicolumn index, uniqueness constraint, foreign key, or primary key, then the index, constraint, or key must be deleted before the column can be deleted. This does not delete `CHECK` constraints that refer to the column. An `IDENTITY/DEFAULT AUTOINCREMENT` column can only be deleted if `IDENTITY_INSERT` is turned off and the table is not a local temporary table.
- **DROP CHECK** — Drop all check constraints for the table. This includes both table check constraints and column check constraints.
- **DROP CONSTRAINT** *constraint-name* — Drop the named constraint for the table or specified column.
- **DROP UNIQUE** (*column-name, ...*) — Drop the unique constraints on the specified column(s). Any foreign keys referencing the unique constraint (rather than the primary key) are also deleted. Reports an error if there are associated foreign-key constraints. Use `ALTER TABLE` to delete all foreign keys that reference the primary key before you delete the primary key constraint.
- **DROP PRIMARY KEY** — Drop the primary key. All foreign keys referencing the primary key for this table are also deleted. Reports an error if there are associated foreign key constraints. If the primary key is unenforced, `DELETE` returns an error if associated unenforced foreign key constraints exist.
- **DROP FOREIGN KEY** *role-name* — Drop the foreign key constraint for this table with the given role name. Retains the implicitly created non-unique `HG` index for the foreign key constraint. Users can explicitly remove the `HG` index with the `DROP INDEX` statement.
- **DROP** [**PARTITION** | **SUBPARTITION**] — Drop the specified partition. The rows in partition `P1` are deleted and the partition definition is dropped. You cannot drop the last partition because dropping the last partition would transform a partitioned table to a non-partitioned table. (To merge a partitioned table, use an `UNPARTITION` clause instead.) For example:

```
CREATE TABLE foo (c1 INT, c2 INT)
    PARTITION BY RANGE (c1)
    (P1 VALUES <= (100) IN dbsp1,
     P2 VALUES <= (200) IN dbsp2,
     P3 VALUES <= (MAX) IN dbsp3
    ) IN dbsp4);
LOAD TABLE ….
ALTER TABLE DROP PARTITION P1;
```

Use **DROP SUBPARTITION**for tables partitioned by a *composite-partitioning-scheme*.

RENAME *rename-object*

- **RENAME** *new-table-name* — Change the name of the table to the *new-table-name*. Any applications using the old table name must be modified. Also, any foreign keys that were automatically assigned the same name as the old table name do not change names.
- **RENAME** *column-name* **TO** *new-column-name* — Change the name of the column to *new-column-name*. Any applications using the old column name must be modified.
- **RENAME** [**PARTITION** | **SUBPARTITION**] — Rename an existing partition or sub-partition.
- **RENAME** *constraint-name* **TO** *new-constraint-name* — Change the name of the constraint to *new-constraint-name*. Any applications using the old constraint name must be modified.

MOVE clause — Moves a table object.

A table object can only reside in one dbspace. Any type of `ALTER MOVE` blocks any modification to the table for the entire duration of the move.

- **MOVE TO** — Move all table objects including columns, indexes, unique constraints, primary key, foreign keys, and metadata resided in the same dbspace as the table is mapped to the new dbspace. The `ALTER` Column `MOVE TO` clause cannot be requested on a partitioned table.
- **MOVE TABLE METADATA** — Move the metadata of the table to a new dbspace. For a partitioned table, `MOVE TABLE METADATA` also moves metadata that is shared among partitions.
- **MOVE PARTITION** — Move the specified partition to the new dbspace.
- **MOVE SUBPARTITION** — Move the specified range subpartition of an existing hash-range partitioned table to the new dbspace.

PARTITION BY — Partitions a non-partitioned table. A non-partitioned table can be partitioned, if all existing rows belong to the first partition. You can specify a different dbspace for the first partition than the dbspace of the column or table. But existing rows are not moved. Instead, the proper dbspace for the column/partition is kept in `SYS.ISYSIQPARTITIONCOLUMN` for existing columns. Only the default or max identity column(s) that are added later for the first partition are stored in the specified dbspace for the first partition.

SAP Sybase IQ supports range, hash, and composite partitioning schemes:

- **PARTITION BY** *RANGE* — Maps data to partitions based on a range of partition keys established for each partition.
- **PARTITION BY** *HASH* — Maps data to partitions based on partition key values processed by a system-defined function. An existing table with rows can only be made hash-range partitioned if all the hash partition keys hash to a single subpartition; in practice, this means only empty tables can always be altered.
- **PARTITION BY** *composite-partitioning-scheme* — Subpartition rows after partitioning by `RANGE` or `HASH`. This method provides the benefits of combined partitioning methods.

Note: Range-partitions and composite partitioning schemes, like hash-range partitions, require the separately licensed VLDB Management option.

SUBPARTITION — Subpartition range or hash partitioned tables by range or hash partitioning strategy. In a *create-clause*, use `SUBPARTITION` to subpartition tables that are partitioned by a *composite-partitioning-scheme*.

- **SUBPARTITION BY RANGE** — Adds a new range subpartition to an existing hash-range partitioned table. The new range subpartition will be logically partitioned by hash with the same hash partitioned keys as the existing hash-range partitioned table.
- **DROP SUBPARTITION** — Delete rows and drops the sub-partition definition from an existing hash-range partitioned table. The specified range subpartition is dropped
- **MOVE PARTITION** — Moves the specified range subpartition of an existing hash-range partitioned table to the new dbspace.
- **MOVE SUBPARTITION** — Moves the column of the specified hash-range partition to the specified dbspace.
- **SPLIT PARTITION** — Splits the specified range subpartition of a hash-range partitioned table into two partitions. Split the specified partition into two partitions. A partition can be split only if no data must be moved. All existing rows of the partition to be split must remain in a single partition after the split. merges range-subpartition-name-1 into range-subpartition-name-2 of a hash-range partitioned table.

  The boundary value for *partition-decl-1* must be less than the boundary value of *partition-name* and the boundary value for *partition-decl-2* must be equal to the boundary value of *partition-name*. You can specify different names for the two new partitions. The old *partition-name* can only be used for the second partition, if a new name is not specified.
- **SPLIT SUBPARTITION** — Splits the specified range subpartition of a hash-range partitioned table into two partitions.

MERGE PARTITION — Merge *partition-name-1* into *partition-name-2*. Two partitions can be merged if they are adjacent partitions and the data resides on the same dbspace. You can only merge a partition with a lower partition value into the adjacent partition with a higher partition value. Note that the server does not check `CREATE` permission on the dbspace into which the partition is merged. For an example of how to create adjacent partitions, see *CREATE TABLE Statement* examples.

RENAME [**PARTITION** | **SUBPARTITION**] — Rename an existing `PARTITION` or `SUBPARTITION`.

UNPARTITION — Remove partitions from a partitioned table. Each column is placed in a single dbspace. Note that the server does not check `CREATE` permission on the dbspace to which data of all partitions is moved. `ALTER TABLE UNPARTITION` blocks all database activities.

ALTER OWNER – Change the owner of a table. The **ALTER OWNER** clause may not be used in conjunction with any other [alter-clause] clauses of the ALTER TABLE statement.

- [**PRESERVE** | **DROP] PERMISSIONS** – If you do not want the new owner to have the same privileges as the old owner, use the DROP permissions clause (default) to drop all explicitly-granted privileges that allow a user access to the table. Implicitly-granted privileges given to the owner of the table are given to the new owner and dropped from the old owner.

  [**PRESERVE** | **DROP] FOREIGN KEYS** If you want to prevent the new owner from accessing data in referenced tables, use the DROP FOREIGN KEYS clause (default) to drop all foreign keys within the table, as well as all foreign keys referring to the table. Use of the PRESERVE FOREIGN KEYS clause with the DROP PERMISSIONS clause fails unless all referencing tables are owned by the new owner.
- The **ALTER TABLE ALTER OWNER** statement fails if:
  - Another table with the same name as the original table exists and is owned by the new user.
  - The PRESERVE FOREIGN KEYS and PRESERVE PERMISSIONS clauses are both specified and there is a foreign key owned by a user other than the new table owner referencing the table that relies on implicitly-granted permissions (such as those given to the owner of a table). To avoid this failure, explicitly grant SELECT permissions to the referring table's original owner, or drop the foreign keys.
  - The PRESERVE FOREIGN KEYS clause is specified, but the PRESERVE PERMISSIONS clause is NOT, and there is a foreign key owned by a user other than the new table owner referencing the table. To avoid this failure, drop the foreign keys.
  - The PRESERVE FOREIGN KEYS clause is specified and the table contains a foreign key that relies on implicitly-granted permissions (such as those given to the owner of a table). To avoid this failure, explicitly GRANT SELECT permissions to the new owner on the referenced table, or drop the foreign keys.
  - The table contains a column with a default value that refers to a sequence, and the USAGE permission of the sequence generator relies on implicitly-granted permissions (such as those given to the owner of a sequence). To avoid this failure, explicitly grant USAGE permission on the sequence generator to the new owner of the table.
  - Enabled materialized views that depend on the original table exist.

Side effects:

- Automatic commit. The `ALTER` and `DROP` options close all cursors for the current connection. The Interactive SQL data window is also cleared.
- A checkpoint is carried out at the beginning of the `ALTER TABLE` operation.

- Once you alter a column or table, any stored procedures, views or other items that refer to the altered column no longer work.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Some clauses are supported by Adaptive Server Enterprise.

Permissions

Syntax 1

The system privileges required for syntax 1 varies depending upon the clause used.

Clause	Privilege Required
Add	Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER privilege on the underlying table • You own the underlying table UNIQUE, PRIMARY KEY, FOREIGN KEY, or IQ UNIQUE column constraint – Requires above along with REFERENCE privilege on the underlying table. FOREIGN KEY table constraint requires above along with one of: • CREATE ANY INDEX system privilege • CREATE ANY OBJECT system privilege • REFERENCE privilege on the base table Hash partition, range partition, or hash-range partition requires above along with one of: • CREATE ANY OBJECT system privilege • CREATE permission on the dbspaces where the partitions are being created
Alter	Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER permission on the table • You own the table. To alter a primary key or unique constraint, also requires REFERENCE permission on the table.

Clause	Privilege Required
Drop	Drop a column with no constraints – Requires one of: • ALTER ANY OBJECT system privilege • ALTER ANY TABLE system privilege • ALTER permission on the underlying table • You own the underlying table Drop a column or table with a constraint requires above along with REFERENCE permission if using ALTER permission. Drop a partition on table owned by self – None required. Drop a partition on table owned by other users – Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER permission on the table
RENAME	Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER permission on the table • You own the table
Move	Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • MANAGE ANY DBSPACE system privilege • ALTER privilege on the underlying table • You own the underlying table Also requires one of the following: • CREATE ANY OBJECT system privilege • CREATE privilege on the dbspace to which the partition is being moved

Clause	Privilege Required
Split Partition or Subpartition	Partition on table owned by self – None required. Partition on table owned by other users – Requires one of: • SELECT ANY TABLE system privilege • SELECT privilege on table Also requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER privilege on the table
Merge Partition or Subpartition Unpartition	Table owned by self – None required. Table owned by other users – Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER privilege on the table
Partition By	Hash partition, range partition, or hash-range partition – Requires one of: • CREATE ANY OBJECT system privilege • CREATE permission on the dbspaces where the partitions are being created Also requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege • ALTER permission on the table • You own the table
Enable or disable RLV store	Requires one of: • ALTER ANY TABLE system privilege • ALTER ANY OBJECT system privilege

Syntax 2

Requires one of:

- ALTER ANY TABLE system privilege
- ALTER ANY OBJECT system privilege
- ALTER privilege on the table
- You own the table

See also

- *CREATE TABLE Statement* on page 197
- *DROP Statement* on page 248
- *IDENTITY_INSERT Option* on page 540
- *FP_NBIT_AUTOSIZE_LIMIT Option* on page 525
- *FP_NBIT_ENFORCE_LIMITS Option* on page 526
- *FP_NBIT_LOOKUP_MB Option* on page 529
- *FP_NBIT_ROLLOVER_MAX_MB Option* on page 530

ALTER TEXT INDEX Statement

Alters the definition of a **TEXT** index.

Note: This statement requires the Unstructured Data Analytics (IQ_UDA) license.

Syntax

```
ALTER TEXT INDEX [ owner.]text-index-name
  ON [ owner.]table-name
  alter-clause
```

Parameters

- **alter-clause –** *rename-object* | *move-object*
- **rename-object – RENAME { AS | TO }** *new-name*
- **move-object – MOVE TO** *dbspace-name*

Examples

- – Create a **TEXT** index, `MyTextIndex`, defining it as **IMMEDIATE REFRESH**, rename the **TEXT** index to `Text_index_daily`, and move the **TEXT** index to a dbspace named `tispace`:

```
CREATE TEXT INDEX MyTextIndex ON Customers ( CompanyName )
IMMEDIATE REFRESH;
```

```
ALTER TEXT INDEX MyTextIndex ON Customers RENAME AS
Text_index_daily;
```

```
ALTER TEXT INDEX Text_Index_Daily ON Customers MOVE TO tispace;
```

Usage

Use **ALTER TEXT INDEX** to rename or move the **TEXT** index.

- **RENAME clause –** rename the **TEXT** index.
- **MOVE clause –** move the **TEXT** index to the specified dbspace.

Side Effects:

- Automatic commit.

Permissions

move-object clause – Requires one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- REFERENCE permission on the underlying table.
- You own the underlying table

rename-object clause – Requires one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- MANAGE ANY DBSPACE
- One of the following:
  - You own the underlying table being indexed.
  - REFERENCE privilege on the table along with one of the following:
    - CREATE ANY OBJECT system privilege.
    - CREATE privilege on the target dbspace.

ALTER TEXT CONFIGURATION Statement

Alters a text configuration object.

Note: This statement requires the Unstructured Data Analytics (IQ_UDA) license.

Syntax

```
ALTER TEXT CONFIGURATION [ owner.]config-name
   STOPLIST stoplist
   | DROP STOPLIST
   | { MINIMUM | MAXIMUM } TERM LENGTH integer
   | TERM BREAKER
      { GENERIC
        [ EXTERNAL NAME library-and-entry-point-name-string ]
      | NGRAM }
   | PREFILTER EXTERNAL NAME library-and-entry-point-name-string
```

Parameters

- ***stoplist* –** *string-expression*
- ***library-and-entry-point-name-string* –** *[operating-system:]function-name@library*

Examples

- **Example 1 –** Create a text configuration object, `maxTerm16`, and then change the maximum term length to 16:

```
CREATE TEXT CONFIGURATION maxTerm16 FROM default_char;

ALTER TEXT CONFIGURATION maxTerm16 MAXIMUM TERM LENGTH 16;
```

- **Example 2 –** Add stoplist terms to the `maxTerm16` configuration object:

```
ALTER TEXT CONFIGURATION maxTerm16

STOPLIST 'because about therefore only';
```

- **Example 3 –** Update the text configuration object, `my_text_config`, to use the entry point `my_term_breaker` in the external library `mytermbreaker.dll` for breaking the text:

```
CREATE TEXT CONFIGURATION my_text_config FROM default_char;

ALTER TEXT CONFIGURATION my_text_config

TERM BREAKER GENERIC EXTERNAL NAME
'platform:my_term_breaker@mytermbreaker';
```

- **Example 4 –** Update the text configuration object, `my_text_config`, to use the entry point `my_prefilter` in the external library `myprefilter.dll` for prefiltering the documents:

```
ALTER TEXT CONFIGURATION my_text_config
PREFILTER EXTERNAL NAME 'platform:my_prefilter@myprefilter';
```

Usage

Use **ALTER TEXT CONFIGURATION** to change a text configuration object.

TEXT indexes are dependent on a text configuration object. SAP Sybase IQ **TEXT** indexes use immediate refresh, and cannot be truncated; you must drop the indexes before you can alter the text configuration object.

To view the settings for text configuration objects, query the **SYSTEXTCONFIG** system view.

STOPLIST clause – use this clause to create or replace the list of terms to ignore when building a **TEXT** index. Terms specified in this list are also ignored in a query. Separate stoplist terms with spaces.

Stoplist terms cannot contain whitespace. Stoplist terms should not contain non-alphanumeric characters. Non-alphanumeric characters are interpreted as spaces and break the term into

multiple terms. For example, “and/or” is interpreted as the two terms “and” and “or”. The maximum number of stoplist terms is 7999.

- **DROP STOPLIST clause –** use this clause to drop the stoplist for a text configuration object.
- **MINIMUM TERM LENGTH clause –** specifies the minimum length, in characters, of a term to include in the **TEXT** index. The value specified in the **MINIMUM TERM LENGTH** clause is ignored when using **NGRAM TEXT** indexes.

  Terms that are shorter than this setting are ignored when building or refreshing the **TEXT** index. The value of this option must be greater than 0. If you set this option to be higher than **MAXIMUM TERM LENGTH**, the value of **MAXIMUM TERM LENGTH** is automatically adjusted to be the same as the new **MINIMUM TERM LENGTH** value.
- **MAXIMUM TERM LENGTH clause –** with **GENERIC TEXT** indexes, specifies the maximum length, in characters, of a term to include in the **TEXT** index. Terms that are longer than this setting are ignored when building or refreshing the **TEXT** index.

  The value of **MAXIMUM TERM LENGTH** must be less than or equal to 60. If you set this option to be lower than **MINIMUM TERM LENGTH**, the value of **MINIMUM TERM LENGTH** is automatically adjusted to be the same as the new **MAXIMUM TERM LENGTH** value.
- **TERM BREAKER clause –** specifies the name of the algorithm to use for separating column values into terms. The choices for **IN SYSTEM** tables are **GENERIC** (the default) or **NGRAM**. The **GENERIC** algorithm treats any string of one or more alphanumerics, separated by non-alphanumerics, as a term.

  The **NGRAM** algorithm breaks strings into n-grams. An n-gram is an n-character substring of a larger string. The **NGRAM** term breaker is required for fuzzy (approximate) matching, or for documents that do not use whitespace or non-alphanumeric characters to separate terms. **NGRAM** is supported for **IN SYSTEM** tables.

  NGRAM term breaker is built on **TEXT** indexes, so use text configuration object settings to define whether to use an **NGRAM** or **GENERIC TEXT** index.

  TERM BREAKER can include the specification for the external term breaker library using **EXTERNAL NAME** and the library entry point.
- **DROP PREFILTER clause –** drops the external prefilter and sets NULL to the prefilter columns in **ISYSTEXTCONFIG** table.
- **PREFILTER EXTERNAL NAME clause –** specifies the entry_point and the library name of the external pre-filter library provided by external vendors.

Side Effects:

- Automatic commit.

Permissions

TERM BREAKER or **PREFILTER EXTERNAL NAME** clause – Requires the CREATE ANY EXTERNAL REFERENCE system privilege, along with one of:

- ALTER ANY TEXT CONFIGURATION system privilege.
- ALTER ANY OBJECT system privilege.
- You own the text configuration object.

All other clauses – Requires the ALTER ANY TEXT CONFIGURATION system privilege, regardless of whether the user is the owner of the configuration object.

ALTER TRIGGER statement

Replaces a trigger definition with a modified version. You must include the entire new trigger definition in the ALTER TRIGGER statement.

Syntax 1 - Change the definition of a trigger

```
ALTER TRIGGER trigger-name trigger-definition
```

```
trigger-definition : CREATE TRIGGER syntax
```

Syntax 2 - Obfuscate a trigger definition

```
ALTER TRIGGER trigger-name ON [owner.] table-name SET HIDDEN
```

Remarks

- **Syntax 1 –** The ALTER TRIGGER statement is identical in syntax to the CREATE TRIGGER statement except for the first word.

  Either the Transact-SQL or Watcom SQL form of the CREATE TRIGGER syntax can be used.
- **Syntax 2 –** You can use SET HIDDEN to obfuscate the definition of the associated trigger and cause it to become unreadable. The trigger can be unloaded and reloaded into other databases.

  Note: The SET HIDDEN operation is irreversible.

Privileges

You must be the owner of the underlying table, or have the one of the following privileges:

ALTER privilege on the underlying table with the CREATE ANY OBJECT system privilege

ALTER ANY TRIGGER system privilege

ALTER ANY OBJECT system privilege

To alter a trigger on a view owned by someone else, you must have either the ALTER ANY TRIGGER and ALTER ANY VIEW system privileges, or you must have the ALTER ANY OBJECT system privilege.

Side effects
Automatic commit.

Standards and compatibility

- **SQL/2008 –** Vendor extension.

ALTER USER Statement

Changes user settings.

Syntax

Syntax 1 – Change the definition of a database user

```
ALTER USER user-name
| [ IDENTIFIED BY password ]
| [ LOGIN POLICY policy-name ]
| [ FORCE PASSWORD CHANGE { ON | OFF } ]
```

Syntax 2 – Refresh the Distinguished Name (DN) for an LDAP user

```
ALTER USER user-name
                REFRESH DN
```

Syntax 2 – Revert a user's login policy to the original values

```
ALTER USER user-name
                RESET LOGIN POLICY
```

Syntax 3 – Change a user's password when CHANGE_PASSWORD_DUAL_CONTROL is enabled in a user's login policy.

```
ALTER USER user-name
                IDENTIFIED [ FIRST | LAST ] BY password_part
```

Parameters

- ***user-name* –** name of the user. Multiple user names cannot be specified when issuing this command.
- **IDENTIFIED BY –** clause providing the password for the user. Clause not supported (ERROR) when CHANGE_PASSWORD_DUAL_CONTROL option is enabled in a user's login policy

- **IDENTIFIED[FIRST | LAST] BY –** clause mandatory when CHANGE_PASSWORD_DUAL_CONTROL option is enabled in a target user's login policy. FIRST | LAST keyword specifies the part of the dual password part being defined.
- ***policy-name* –** name of the login policy to assign the user. No change is made if the **LOGIN POLICY** clause is not specified.
- **FORCE PASSWORD CHANGE –** controls whether the user must specify a new password when he or she logs in. This setting overrides the `PASSWORD_EXPIRY_ON_NEXT_LOGIN` option setting in their policy.

  Note: This functionality is not currently implemented when logging in to Sybase Control Center. A user will not be prompted to change their password. He or she will be prompted, however, when logging in to SAP Sybase IQ outside of Sybase Control Center (for example, using Interactive SQL).
- **RESET LOGIN POLICY –** reverts the settings of the user's login to the original values in the login policy. This usually clears all locks that are implicitly set due to the user exceeding the failed logins or exceeding the maximum number of days since the last login. When you reset a login policy, a user can access an account that has been locked for exceeding a login policy option limit such as `MAX_FAILED_LOGIN_ATTEMPTS` or `MAX_DAYS_SINCE_LOGIN`.
- **REFRESH DN –** clears the saved DN and timestamp for a user, which is used during LDAP authentication.

Examples

- **Example 1 –** alters a user named `SQLTester`. The password is set to `welcome`. The `SQLTester` user is assigned to the `Test1` login policy and the password does not expire on the next login:

```
ALTER USER SQLTester
IDENTIFIED BY welcome
LOGIN POLICY Test1
FORCE PASSWORD CHANGE OFF
```

- **Example 2 –** clears the distinguished name (DN) and timestamp for a user named `Mary` used for LDAP authentication:

```
ALTER USER Mary REFRESH DN
```

- **Example 3 –** sets the password for user3 to PassPart1PassPart2. This assumes that `user1` and `user2` have the CHANGE PASSWORD system privilege and the change_password_dual_control option is enabled (ON) in the login policy for `user3`:

  User1 enters:ALTER USER user3 IDENTIFIED FIRST BY PassPart1

  User2 enters:ALTER USER user3 IDENTIFIED LAST BY PassPart2

  Once set, user3 logs on by entering the password `PassPart1PassPart2`.

Usage

User IDs and passwords cannot:

- Begin with white space, single quotes, or double quotes
- End with white space
- Contain semicolons

Passwords cannot exceed 255 characters.

If you set the `PASSWORD_EXPIRY_ON_NEXT_LOGIN` value to ON, the passwords of all users assigned to this login policy expire immediately when he or she next logs in. You can use the **ALTER USER** and **LOGIN POLICY** clauses to force users to change their passwords at the next login.

If the CHANGE_PASSWORD_DUAL CONTROL login policy option is disable (OFF) during the dual password change process:

- the target user will be unable to log in with the single password part already defined. The **ALTER USER** command must be reissued using single password control syntax.
- If the option is disabled after the dual password change process is complete, but before the target user logs in, there is no impact on the target user. The target user must log in using both password parts.

If the target user is already logged in when the dual password change process occurs, the user cannot change their password in the current session until both parts of the new password are set. Once the dual password change process is complete, the target user can use **GRANT CONNECT**, **ALTER USER**, **sp_password**, or **sp_iqpassword** to the password without first logging out. The prompt to enter the current password, use the new dual control password, not the password originally entered for the current session.

The **GRANT CONNECT** statement is not supported during for the dual password change process to set either password part. However, once the dual password change process is complete, the target user can use the **GRANT CONNECT** statement, **ALTER USER**, **sp_password**, or **sp_iqpassword** to change their password without first logging out.

As soon as both parts of the password are successfully specified by users with the CHANGE PASSWORD system privilege, the password for the target user is automatically expired. This forces the target user to change the password the next time he or she logs in.

The encryption algorithm used for hashing the user passwords is FIPS-certified encryption support:

- The DLL is called **dbfips10.dll**
- The HASH function accepts the algorithms: **SHA1_FIPS SHA256_FIPS**
- If the **-fips** server option is specified and an algorithm that is not FIPS-certified is given to the HASH function, the database server uses **SHA1_FIPS** instead of **SHA1**, **SHA256_FIPS**

instead of **SHA256**, and returns an error if **MD5** is used (**MD5** is not a FIPS-certified algorithm).
- If the **-fips** option is specified, the database server uses SHA256_FIPS for password hashing.

Standards

- SQL – Vendor extension to ISO/ANSI SQL grammar.
- Sybase – Not supported by Adaptive Server Enterprise.

Permissions

- To change own password – None required.
- To change the password of any user – Requires the CHANGE PASSWORD system privilege.
- To use the **LOGIN POLICY**, **FORCE PASSWORD CHANGE**, **RESET LOGIN POLICY**, or **REFRESH DN** clauses requires the MANAGE ANY USER system privilege.

See also

- *COMMENT Statement* on page 93
- *CREATE LOGIN POLICY Statement* on page 149
- *CREATE USER Statement* on page 223
- *DROP LOGIN POLICY Statement* on page 256
- *DROP USER Statement* on page 268
- *ALTER LOGIN POLICY Statement* on page 24
- *GRANT ROLE Statement* on page 305
- *GRANT System Privilege Statement* on page 312
- *REVOKE System Privilege Statement* on page 399
- *REVOKE ROLE Statement* on page 395

ALTER VIEW Statement

Replaces a view definition with a modified version.

Syntax

Syntax 1 – Alter the structure of the view

```
ALTER VIEW
… [ owner.]view-name [ ( column-name [ , … ] ) ]
… AS select-statement
… [ WITH CHECK OPTION ]
```

Syntax 2 – Change attributes for the view

```
ALTER VIEW
... [ owner.]view-name
... { SET HIDDEN | RECOMPILE | DISABLE | ENABLE }
```

Usage

- **AS clause –** purpose and syntax identical to **CREATE VIEW** statement. See *CREATE VIEW Statement*.
- **WITH CHECK OPTION clause –** purpose and syntax identical to **CREATE VIEW** statement.
- **SET HIDDEN clause –** obfuscate the definition of the view and cause the view to become hidden from view, for example in Sybase Control Center. Explicit references to the view still work.

  Warning! The **SET HIDDEN** operation is irreversible.
- **RECOMPILE clause –** recreate the column definitions for the view. Identical in functionality to the **ENABLE** clause, except you can use it on a view that is not disabled.
- **DISABLE clause –** disable the view from use by the database server.
- **ENABLE clause –** enable a disabled view, which causes the database server to recreate the column definitions for the view. Before you enable a view, you must enable any views on which it depends.

When you alter a view, existing permissions on the view are maintained and do not require reassignment. Instead of using the **ALTER VIEW** statement, you could also drop the view and recreate it using **DROP VIEW** and **CREATE VIEW**, respectively. If you do this, view permissions must be reassigned.

After completing the view alteration using Syntax 1, the database server recompiles the view. Depending on the type of change you made, if there are dependent views, the database server attempts to recompile them. If you made changes that impact a dependent view, that view may become invalid, requiring you to alter the definition for the dependent view.

Warning! If the **SELECT** statement defining the view contains an asterisk (*), the number of the columns in the view could change if columns were added or deleted from the underlying tables. The names and data types of the view columns could also change.

- **Syntax 1 –** alter the structure of the view. Unlike altering tables, where your change might be limited to individual columns, altering the structure of a view requires that you replace the entire view definition with a new definition, much as you would when creating the view using the **CREATE VIEW** statement.
- **Syntax 2 –** change attributes for the view, such as whether the view definition is hidden.

When you use **SET HIDDEN**, you can unload and reload the view into other databases. Debugging using the debugger does not show the view definition, nor is it available through

procedure profiling. If you need to change the definition of a hidden view, you must drop the view and create it again using the **CREATE VIEW** statement.

When you use the **DISABLE** clause, the view is no longer available for use by the database server to answer queries. Disabling a view is similar to dropping one, except that the view definition remains in the database. Disabling a view also disables any dependent views. Therefore, the **DISABLE** clause requires exclusive access, not only to the view being disabled, but to any dependent views, which are also disabled.

Side effects:

- Automatic commit
- All procedures and triggers are unloaded from memory, so that any procedure or trigger that references the view reflects the new view definition. The unloading and loading of procedures and triggers can have a performance impact if you regularly alter views.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

RECOMPILE or **ENABLE** clause – For view requires one of:

- ALTER ANY VIEW system privilege.
- ALTER ANY OBJECT system privilege.
- You own the view.
- Also require one of:
  - SELECT ANY TABLE system privilege.
  - SELECT privilege on the underlying tables of the view.

For materialized view requires one of:

- ALTER ANY MATERIALNESS VIEW system privilege.
- ALTER ANY OBJECT system privilege.
- You own the materialized view.
- Also require one of:
  - SELECT ANY TABLE system privilege.
  - SELECT privilege on the underlying tables of the materialized view.

DISABLE clause – For view requires one of:

- ALTER ANY VIEW system privilege.
- ALTER ANY OBJECT system privilege.
- You own the view.

For materialized view requires one of:

- ALTER ANY MATERIALIZED VIEW system privilege.
- ALTER ANY OBJECT system privilege.
- You own the materialized view.

All other clauses require one of:

- ALTER ANY OBJECT system privilege.
- You own the view.

See also

- *CREATE VIEW Statement* on page 227
- *DROP Statement* on page 248
- *Identifying and Fixing Invalid Dependent Views* on page 74

Identifying and Fixing Invalid Dependent Views

Check for, and correct, any dependent views that become invalid due to changes to their underlying tables.

Under most circumstances the database server automatically recompiles views to keep them valid if the underlying tables change. However, if your table alteration removes or materially changes something referenced by the view definition, then the dependent view becomes invalid. For example, if you remove a column referenced in the view definition, then the dependent view is no longer valid. Correct the view definition and manually recompile the view.

1. Run **sa_dependent_views** to get the list of dependent views.
2. Perform the DDL operation that alters the table. The server automatically disables dependent views, and attempts to recompile them once the DDL is complete.
3. Check that all the views listed by **sa_dependent_views** are valid. For example, perform a simple test such as **SELECT * FROM myview**.
4. If a view is invalid, it is likely you will need to alter the view definition to resolve the issue. Examine the view definition against the DDL change that you made and make the necessary changes. Run **ALTER VIEW RECOMPILE** to correct the view definition.
5. Test the corrected view to make sure it works. For example, perform a simple test such as **SELECT * FROM myview**.

The **sa_dependent_views** system procedure returns the list of all dependent views for a given table or view.

See also

- *ALTER VIEW Statement* on page 71

BACKUP Statement

Backs up an SAP Sybase IQ database on one or more archive devices.

Syntax

```
BACKUP DATABASE
[ backup-option… ]
TO archive_device [ archive-option... ]
… [ WITH COMMENT string ]
```

Parameters

- **backup-option –**

  ```
  { READWRITE FILES ONLY |
  READONLY dbspace-or-file [, … ] }
  CRC { ON | OFF }
  ATTENDED { ON | OFF }
  BLOCK FACTOR integer
  { FULL | INCREMENTAL | INCREMENTAL SINCE FULL }
  VIRTUAL { DECOUPLED |
  ENCAPSULATED 'shell_command' }
  WITH COMMENT comment
  ```

- **dbspace-or-file –**

  ```
  { DBSPACES identifier-list | FILES identifier-list }
  ```

- **identifier-list –**

  ```
  identifier [, … ]
  ```

- **archive-option –**

  ```
  SIZE integer STACKER integer
  ```

Examples

- **Example 1 –** This UNIX example backs up the `iqdemo` database onto tape devices `/dev/rmt/0` and `/dev/rmt/2` on a Sun Solaris platform. On Solaris, the letter `n` after the device name specifies the “no rewind on close” feature. Always specify this feature with **BACKUP**, using the naming convention appropriate for your UNIX platform (Windows does not support this feature). This example backs up all changes to the database since the last full backup:

  ```
  BACKUP DATABASE
  INCREMENTAL SINCE FULL
  TO '/dev/rmt/0n' SIZE 10000000
  TO '/dev/rmt/2n' SIZE 15000000
  ```

  Note: Size units are kilobytes (KB), although in most cases, size of less than 1GB are inappropriate. In this example, the specified sizes are 10GB and 15GB.

- **Example 2 –** These **BACKUP** commands specify read-only files and dbspaces:

```
BACKUP DATABASE READONLY DBSPACES dsp1
TO '/dev/rmt/0'
```

```
BACKUP DATABASE READONLY FILES dsp1_f1, dsp1_f2
TO 'bkp.f1f2'
```

```
BACKUP DATABASE READONLY DBSPACES dsp2, dsp3
READONLY FILES dsp4_f1, dsp5_f2
TO 'bkp.RO'
```

Usage

The SAP Sybase IQ database might be open for use by many readers and writers when you execute a **BACKUP** command. It acts as a read-only user and relies on the Table Level Versioning feature of SAP Sybase IQ to achieve a consistent set of data.

BACKUP implicitly issues a **CHECKPOINT** prior to commencing, and then it backs up the catalog tables that describe the database (and any other tables you have added to the catalog store). During this first phase, SAP Sybase IQ does not allow any metadata changes to the database (such as adding or dropping columns and tables). Correspondingly, a later **RESTORE** of the backup restores only up to that initial **CHECKPOINT**.

The **BACKUP** command lets you specify full or incremental backups. You can choose two kinds of incremental backups. **INCREMENTAL** backs up only those blocks that have changed and committed since the last **BACKUP** of any type (incremental or full). **INCREMENTAL SINCE FULL** backs up all of the blocks that have changed since the last full backup. The first type of incremental backup can be smaller and faster to do for **BACKUP** commands, but slower and more complicated for **RESTORE** commands. The opposite is true for the other type of incremental backup. The reason is that the first type generally results in N sets of incremental backup archives for each full backup archive. If a restore is required, a user with the SERVER OPERATOR system privilege must **RESTORE** the full backup archive first, and then each incremental archive in the proper order. (SAP Sybase IQ keeps track of which ones are needed.) The second type requires the user with the SERVER OPERATOR system privilege to restore only the full backup archive and the last incremental archive.

Incremental virtual backup is supported using the **VIRTUAL DECOUPLED** and **VIRTUAL ENCAPSULATED** parameters of the **BACKUP** statement.

Although you can perform an OS-level copy of tablespaces to make a virtual backup of one or more read-only dbspaces, use the virtual backup statement, because it records the backup in the SAP Sybase IQ system tables.

READWRITE FILES ONLY may be used with **FULL**, **INCREMENTAL**, and **INCREMENTAL SINCE FULL** to restrict the backup to only the set of read-write files in the database. The read-write dbspaces/files must be SAP Sybase IQ dbspaces.

If **READWRITE FILES ONLY** is used with an **INCREMENTAL** or **INCREMENTAL SINCE FULL** backup, the backup will not back up data on read-only dbspaces or dbfiles that has changed since the depends-on backup. If **READWRITE FILES ONLY** is not specified for an

INCREMENTAL or **INCREMENTAL SINCE FULL** backup, the backup backs up all database pages that have changed since the depends-on backup, both on read-write and read-only dbspaces.

- **CRC clause –** activate 32-bit cyclical redundancy checking on a per block basis (in addition to whatever error detection is available in the hardware). When you specify this clause, the numbers computed on backup are verified during any subsequent **RESTORE** operation, affecting performance of both commands. The default is ON.
- **ATTENDED clause –** applies only when backing up to a tape device. If **ATTENDED ON** (the default) is used, a message is sent to the application that issued the **BACKUP** statement if the tape drive requires intervention. This might happen, for example, when a new tape is required. If you specify OFF, **BACKUP** does not prompt for new tapes. If additional tapes are needed and OFF has been specified, SAP Sybase IQ gives an error and aborts the **BACKUP** command. However, a short delay is included to account for the time an automatic stacker drive requires to switch tapes.
- **BLOCK FACTOR clause –** specify the number of blocks to write at one time. Its value must be greater than 0, or SAP Sybase IQ generates an error message. Its default is 25 for UNIX systems and 15 for Windows systems (to accommodate the smaller fixed tape block sizes). This clause effectively controls the amount of memory used for buffers. The actual amount of memory is this value times the block size times the number of threads used to extract data from the database. Set **BLOCK FACTOR** to at least 25.
- **FULL clause –** specify a full backup; all blocks in use in the database are saved to the archive devices. This is the default action.
- **INCREMENTAL clause –** specify an incremental backup; all blocks changed since the last backup of any kind are saved to the archive devices.

  The keyword **INCREMENTAL** is not allowed with **READONLY FILES**.
- **INCREMENTAL SINCE FULL clause –** specify an incremental backup; all blocks changed since the last full backup are saved to the archive devices.
- **VIRTUAL DECOUPLED clause –** specify a decoupled virtual backup. For the backup to be complete, you must copy the SAP Sybase IQ dbspaces after the decoupled virtual backup finishes, and then perform a nonvirtual incremental backup.
- **VIRTUAL ENCAPSULATED clause –** specify an encapsulated virtual backup. The ‘shell-command’ argument can be a string or variable containing a string that is executed as part of the encapsulated virtual backup. The shell commands execute a system-level backup of the IQ store as part of the backup operation. For security reasons, it is recommended that an absolute path be specified in the 'shell-command,' and file protections on that directory be in place to prevent execution of an unintended program.
- **TO clause –** specify the name of the archive_device to be used for backup, delimited with single quotation marks. The archive_device is a file name or tape drive device name for the archive file. If you use multiple archive devices, specify them using separate **TO** clauses.

(A comma-separated list is not allowed.) Archive devices must be distinct. The number of **TO** clauses determines the amount of parallelism SAP Sybase IQ attempts with regard to output devices.

BACKUP and **RESTORE** write your SAP Sybase IQ data in parallel to or from all of the archive devices you specify. The catalog store is written serially to the first device. Faster backups and restores result from greater parallelism.

SAP Sybase IQ supports a maximum of 36 hardware devices for backup. For faster backups, specifying one or two devices per core will help to avoid hardware and IO contention. Set the **SIZE** parameter on the **BACKUP** command to avoid creating multiple files per backup device and consider the value used in the **BLOCK FACTOR** clause on the **BACKUP** command.

BACKUP overwrites existing archive files unless you move the old files or use a different *archive_device* name or path.

The backup API DLL implementation lets you specify arguments to pass to the DLL when opening an archive device. For third-party implementations, the archive_device string has this format:

```
'DLLidentifier::vendor_specific_information'
```

A specific example:

```
'spsc::workorder=12;volname=ASD002'
```

The *archive_device* string length can be up to 1023 bytes. The *DLLidentifier* portion must be 1 to 30 bytes in length and can contain only alphanumeric and underscore characters. The *vendor_specific_information* portion of the string is passed to the third-party implementation without checking its contents. Do not specify the **SIZE** or **STACKER** clauses of the **BACKUP** command when using third-party implementations, as that information should be encoded in the *vendor_specific_information* portion of the string.

Note: Only certain third-party products are certified with SAP Sybase IQ using this syntax. See the *Release Bulletin* for additional usage instructions or restrictions. Before using any third-party product to back up your SAP Sybase IQ database in this way, make sure it is certified. See the *Release Bulletin*, or see the SAP Sybase Certification Reports for the SAP Sybase IQ product in *Technical Documents at http://www.sybase.com/support/techdocs/*.

For the Sybase implementation of the backup API, you need to specify only the tape device name or file name. For disk devices, you should also specify the SIZE value, or SAP Sybase IQ assumes that each created disk file is no larger than 2GB on UNIX, or 1.5GB on Windows. An example of an archive device for the SAP Sybase API DLL that specifies a tape device for certain UNIX systems is:

```
'/dev/rmt/0'
```

- **SIZE clause –** specify maximum tape or file capacity per output device (some platforms do not reliably detect end-of-tape markers). No volume used on the corresponding device should be shorter than this value. This value applies to both tape and disk files but not third-party devices.

Units are kilobytes (KB), although in general, less than 1GB is inappropriate. For example, for a 3.5GB tape, specify 3500000. Defaults are by platform and medium. The final size of the backup file will not be exact, because backup writes in units of large blocks of data.

The **SIZE** parameter is per output device. **SIZE** does not limit the number of bytes per device; **SIZE** limits the file size. Each output device can have a different **SIZE** parameter.

During backup, when the amount of information written to a given device reaches the value specified by the **SIZE** parameter, **BACKUP** does one of the following:

- If the device is a file system device, **BACKUP** closes the current file and creates another file of the same name, with the next ascending number appended to the file name, for example, `bkup1.dat1.1`, `bkup1.dat1.2`, `bkup1.dat1.3`.
- If the device is a tape unit, **BACKUP** closes the current tape and you need to mount another tape.

It is your responsibility to mount additional tapes if needed, or to ensure that the disk has enough space to accommodate the backup.

When multiple devices are specified, **BACKUP** distributes the information across all devices.

Table 2. BACKUP default sizes

Platform	Default SIZE for tape	Default SIZE for disk
UNIX	none	2GB
Windows	1.5GB **SIZE** must be a multiple of 64. Other values are rounded down to a multiple of 64.	1.5GB

- **STACKER clause –** specify that the device is automatically loaded, and specifies the number of tapes with which it is loaded. This value is not the tape position in the stacker, which could be zero. When **ATTENDED** is OFF and **STACKER** is ON, SAP Sybase IQ waits for a predetermined amount of time to allow the next tape to be autoloaded. The number of tapes supplied along with the **SIZE** clause are used to determine whether there is enough space to store the backed-up data. Do not use this clause with third-party media management devices.
- **WITH COMMENT clause –** specify an optional comment recorded in the archive file and in the backup history file. Maximum length is 32KB. If you do not specify a value, a NULL string is stored.

Other issues for **BACKUP** include:

- **BACKUP** does not support raw devices as archival devices.
- Windows systems support only fixed-length I/O operations to tape devices (for more information about this limitation, see your *Installation and Configuration Guide*). Although Windows supports tape partitioning, SAP Sybase IQ does not use it, so do not

use another application to format tapes for **BACKUP**. Windows has a simpler naming strategy for its tape devices, where the first tape device is `\\.\`*tape0*, the second is `\\.\`*tape1*, and so on.

Warning! For backup (and for most other situations) SAP Sybase IQ treats the leading backslash in a string as an escape character, when the backslash precedes an n, an x, or another backslash. For this reason, when you specify backup tape devices, you must double each backslash required by the Windows naming convention. For example, indicate the first Windows tape device you are backing up to as '`\\\\.\\tape0`', the second as '`\\\\.\\tape1`', and so on. If you omit the extra backslashes, or otherwise misspell a tape device name, and write a name that is not a valid tape device on your system, SAP Sybase IQ interprets this name as a disk file name.

- SAP Sybase IQ does not rewind tapes before using them. You must ensure the tapes used for **BACKUP** or **RESTORE** are at the correct starting point before putting them in the tape device. SAP Sybase IQ does rewind tapes after using them on rewinding devices.
- During **BACKUP** and **RESTORE** operations, if SAP Sybase IQ cannot open the archive device (for example, when it needs the media loaded) and the **ATTENDED** parameter is ON, it waits for ten seconds and tries again. It continues these attempts indefinitely until either it is successful or the operation is terminated with a Ctrl+C.
- If you enter Ctrl+C, **BACKUP** fails and returns the database to the state it was in before the backup started.
- If disk striping is used, such as on a RAID device, the striped disks are treated as a single device.

Side effects:

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires one of:

- BACK UP DATABASE system privilege.
- You own the database.

See also

- *RESTORE DATABASE Statement* on page 380

BEGIN … END Statement

Groups SQL statements together.

Syntax

```
[ statement-label : ]
… BEGIN [ [ NOT ] ATOMIC ]
… [ local-declaration ; … ]
… statement-list
… [ EXCEPTION [ exception-case … ] ]
… END [ statement-label ]
```

Parameters

- **local-declaration –** { *variable-declaration* | *cursor-declaration* | *exception-declaration* | *temporary-table-declaration* }
- **variable-declaration – DECLARE** *variable-name* [, …] *data-type* [{ **=** | **DEFAULT**} *initial-value*]
- **initial-value –** *special-value* | *string* | [-] *number* | (*constant-expression*) | *built-in-function* (*constant-expression*) | **NULL**
- **special-value – CURRENT** { **DATABASE** | **DATE** | **PUBLISHER** | **TIME** | **TIMESTAMP** | **USER** | **UTC TIMESTAMP** } | **USER**

Examples

- **Example 1 –** The body of a procedure is a compound statement:

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35), OUT
TopValue INT)
BEGIN
  DECLARE err_notfound EXCEPTION FOR
    SQLSTATE '02000' ;
  DECLARE curThisCust CURSOR FOR
    SELECT CompanyName, CAST(
        sum(SalesOrderItems.Quantity *
        Products.UnitPrice) AS INTEGER) VALUE
    FROM Customers
        LEFT OUTER JOIN Salesorders
        LEFT OUTER JOIN SalesOrderItems
        LEFT OUTER JOIN Products
    GROUP BY CompanyName ;
  DECLARE ThisValue INT ;
  DECLARE ThisCompany CHAR(35) ;
  SET TopValue = 0 ;
  OPEN curThisCust ;


  CustomerLoop:
  LOOP
```

```
    FETCH NEXT curThisCust
      INTO ThisCompany, ThisValue ;
    IF SQLSTATE = err_notfound THEN
      LEAVE CustomerLoop ;
    END IF ;
    IF ThisValue > TopValue THEN
      SET TopValue = ThisValue ;
      SET TopCompany = ThisCompany ;
    END IF ;
  END LOOP CustomerLoop ;


CLOSE curThisCust ;
END
```

Usage

The body of a procedure is a compound statement. Compound statements can also be used in control statements within a procedure.

A compound statement allows one or more SQL statements to be grouped together and treated as a unit. A compound statement starts with **BEGIN** and ends with **END**. Immediately after **BEGIN**, a compound statement can have local declarations that exist only within the compound statement. A compound statement can have a local declaration for a variable, a cursor, a temporary table, or an exception. Local declarations can be referenced by any statement in that compound statement, or in any compound statement nested within it. Local declarations are invisible to other procedures that are called from within a compound statement.

If the ending *statement-label* is specified, it must match the beginning *statement-label*. You can use the **LEAVE** statement to resume execution at the first statement after the compound statement. The compound statement that is the body of a procedure has an implicit label that is the same as the name of the procedure.

An atomic statement is a statement executed completely or not at all. For example, an **UPDATE** statement that updates thousands of rows might encounter an error after updating many rows. If the statement does not complete, all changes revert back to their original state. Similarly, if you specify that the **BEGIN** statement is atomic, the statement is executed either in its entirety or not at all.

If you specify **initial-value**, the variable is set to that value. If you do not specify an **initial-value**, the variable contains the NULL value until a **SET** statement assigns a different value.

If you specify **initial-value**, the data type must match the type defined by *data-type*.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise. This does not mean that all statements inside a compound statement are supported.

  BEGIN and **END** keywords are not required in Transact-SQL.

BEGIN and **END** are used in Transact-SQL to group a set of statements into a single compound statement, so that control statements such as **IF … ELSE**, which affect the performance of only a single SQL statement, can affect the performance of the whole group. The ATOMIC keyword is not supported by Adaptive Server Enterprise.

In Transact-SQL. **DECLARE** statements need not immediately follow **BEGIN**, and the cursor or variable that is declared exists for the duration of the compound statement. You should declare variables at the beginning of the compound statement for compatibility.

Permissions

None

See also

- *DECLARE LOCAL TEMPORARY TABLE Statement* on page 239
- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *LEAVE Statement* on page 333
- *RESIGNAL Statement* on page 379
- *SIGNAL Statement* on page 428

BEGIN PARALLEL IQ … END PARALLEL IQ Statement

Groups **CREATE INDEX** statements together for execution at the same time.

Syntax

```
... BEGIN PARALLEL IQ
 statement-list
... END PARALLEL IQ
```

Parameters

- **statement-list –** a list of **CREATE INDEX** statements

Examples

- **Example 1 –** This statement executes atomically. If one command fails, the entire statement rolls back:

```
BEGIN PARALLEL IQ
    CREATE HG INDEX c1_HG on table1 (col1);
    CREATE HNG INDEX c12_HNG on table1 (col12);
    CREATE LF INDEX c1_LF on table1 (col1);
    CREATE HNG INDEX c2_HNG on table1 (col2);
END PARALLEL IQ
```

Usage

The **BEGIN PARALLEL IQ … END PARALLEL IQ** statement lets you execute a group of **CREATE INDEX** statements as though they are a single DDL statement, creating indexes on multiple IQ tables at the same time. While this statement is executing, you and other users cannot issue other DDL statements.

Note: This statement does not support RLV-enabled tables.

Note: This statement does not support **TEXT** indexes.

Side effects:

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise. For support of statements inside the statement, see *CREATE INDEX Statement*.

Permissions

None

See also

- *CREATE INDEX Statement* on page 136

BEGIN TRANSACTION Statement [T-SQL]

Use this statement to begin a user-defined transaction.

Note: BEGIN TRANSACTION is a T-SQL construct and must contain only valid T-SQL commands. You cannot mix T-SQL and non-T-SQL commands.

Syntax

BEGIN TRAN[**SACTION**] [*transaction-name*]

Examples

- **Example 1 –** This batch reports successive values of **@@trancount** as 0, 1, 2, 1, 0. The values are printed on the server window:

```
PRINT @@trancount
BEGIN TRANSACTION
PRINT @@trancount
BEGIN TRANSACTION
PRINT @@trancount
```

```
COMMIT TRANSACTION
PRINT @@trancount
COMMIT TRANSACTION
PRINT @@trancount
```

You should not rely on the value of @@trancount for more than keeping track of the number of explicit **BEGIN TRANSACTION** statements that have been issued.

When Adaptive Server Enterprise starts a transaction implicitly, the @@trancount variable is set to 1. SAP Sybase IQ does not set the @@trancount value to 1 when a transaction is started implicitly. So, the SAP Sybase IQ @@trancount variable has a value of zero before any **BEGIN TRANSACTION** statement (even though there is a current transaction), while in Adaptive Server Enterprise (in chained mode) it has a value of 1.

For transactions starting with a **BEGIN TRANSACTION** statement, @@trancount has a value of 1 in both SAP Sybase IQ and Adaptive Server Enterprise after the first **BEGIN TRANSACTION** statement. If a transaction is implicitly started with a different statement, and a **BEGIN TRANSACTION** statement is then executed, @@trancount has a value of 2 in both SAP Sybase IQ, and Adaptive Server Enterprise after the **BEGIN TRANSACTION** statement.

Usage

The optional parameter *transaction-name* is the name assigned to this transaction. It must be a valid identifier. Use transaction names only on the outermost pair of nested **BEGIN/COMMIT** or **BEGIN/ROLLBACK** statements.

When executed inside a transaction, the **BEGIN TRANSACTION** statement increases the nesting level of transactions by one. The nesting level is decreased by a **COMMIT** statement. When transactions are nested, only the outermost **COMMIT** makes the changes to the database permanent.

Both Adaptive Server Enterprise and SAP Sybase IQ have two transaction modes.

The default Adaptive Server Enterprise transaction mode, called unchained mode, commits each statement individually, unless an explicit **BEGIN TRANSACTION** statement is executed to start a transaction. In contrast, the ISO SQL/2003 compatible chained mode only commits a transaction when an explicit **COMMIT** is executed or when a statement that carries out an autocommit (such as data definition statements) is executed.

You can control the mode by setting the chained database option. The default setting for ODBC and embedded SQL connections in SAP Sybase IQ is On, in which case SAP Sybase IQ runs in chained mode. (ODBC users should also check the AutoCommit ODBC setting). The default for TDS connections is Off.

In unchained mode, a transaction is implicitly started before any data retrieval or modification statement. These statements include: **DELETE**, **INSERT**, **OPEN**, **FETCH**, **SELECT**, and **UPDATE**. You must still explicitly end the transaction with a **COMMIT** or **ROLLBACK** statement.

You cannot alter the chained option within a transaction.

Note: When calling a stored procedure, you should ensure that it operates correctly under the required transaction mode.

The current nesting level is held in the global variable @@trancount. The @@trancount variable has a value of zero before the first **BEGIN TRANSACTION** statement is executed, and only a **COMMIT** executed when @@trancount is equal to one makes changes to the database permanent.

A **ROLLBACK** statement without a transaction or savepoint name always rolls back statements to the outermost **BEGIN TRANSACTION** (explicit or implicit) statement, and cancels the entire transaction.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

None

See also

- *COMMIT Statement* on page 98
- *ROLLBACK TRANSACTION Statement [T-SQL]* on page 405
- *SAVE TRANSACTION Statement [T-SQL]* on page 406
- *ISOLATION_LEVEL Option* on page 549

CALL Statement

Invokes a procedure.

Syntax

Syntax 1

```
[ variable = ] CALL procedure-name ( [ expression ] [ , … ] )
```

Syntax 2

```
[ variable = ] CALL procedure-name ( [ parameter-name = expression ]
[ , … ] )
```

Examples

- **Example 1 –** Call the `sp_customer_list` procedure. This procedure has no parameters, and returns a result set:

```
CALL sp_customer_list()
```

- **Example 2 –** This **dbisql** example creates a procedure to return the number of orders placed by the customer whose ID is supplied, creates a variable to hold the result, calls the procedure, and displays the result:

```
CREATE PROCEDURE OrderCount (IN CustomerID INT, OUT Orders INT)
BEGIN
SELECT COUNT("DBA".SalesOrders.ID)
INTO Orders
FROM "DBA".Customers
KEY LEFT OUTER JOIN "DBA".SalesOrders
WHERE "DBA".Customers.ID = CustomerID ;
END
go
-- Create a variable to hold the result
CREATE VARIABLE Orders INT
go

-- Call the procedure, FOR customer 101
-- -----------------------------
CALL OrderCount ( 101, Orders)
go
--------------------------------
--  Display the result
SELECT Orders FROM DUMMY
go
```

Usage

CALL invokes a procedure that has been previously created with a **CREATE PROCEDURE** statement. When the procedure completes, any INOUT or OUT parameter values are copied back.

You can specify the argument list by position or by using keyword format. By position, arguments match up with the corresponding parameter in the parameter list for the procedure. By keyword, arguments match the named parameters.

Procedure arguments can be assigned default values in the **CREATE PROCEDURE** statement, and missing parameters are assigned the default value, or, if no default is set, NULL.

Inside a procedure, **CALL** can be used in a **DECLARE** statement when the procedure returns result sets.

Note: You cannot reference a Table UDF in a **CALL** SQL statement.

Procedures can return an integer value (as a status indicator, say) using the **RETURN** statement. You can save this return value in a variable using the equality sign as an assignment operator:

```
CREATE VARIABLE returnval INT ;
returnval = CALL proc_integer ( arg1 = val1, ... )
```

Note: Use of this statement to invoke a function is deprecated. To call functions, use an assignment statement to invoke the function and assign its result to a variable. For example:

```
DECLARE varname INT;
SET varname=test( );
```

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise. For an alternative that is supported, see *EXECUTE Statement [ESQL]*.

Permissions

Requires one of:

- EXECUTE ANY PROCEDURE system privilege.
- EXECUTE permission for the procedure
- You own the procedure

See also

- *CREATE PROCEDURE Statement* on page 159
- *EXECUTE Statement [ESQL]* on page 269
- *GRANT EXECUTE Statement* on page 303

CASE Statement

Selects execution path based on multiple cases.

Syntax

```
CASE value-expression
…WHEN [ constant | NULL ] THEN statement-list …
… [ WHEN [ constant | NULL ] THEN statement-list ] …
…ELSE statement-list
… END
```

Examples

- **Example 1 –** This procedure using a **CASE** statement classifies the products listed in the `Products` table of the demo database into one of shirt, hat, shorts, or unknown:

```
CREATE PROCEDURE ProductType (IN product_id INT, OUT type
CHAR(10))
  BEGIN
  DECLARE prod_name CHAR(20) ;
  SELECT name INTO prod_name FROM "GROUPO"."Products"
```

```
  WHERE ID = product_id;
  CASE prod_name
  WHEN 'Tee Shirt' THEN
    SET type = 'Shirt'
  WHEN 'Sweatshirt' THEN
    SET type = 'Shirt'
  WHEN 'Baseball Cap' THEN
    SET type = 'Hat'
  WHEN 'Visor' THEN
    SET type = 'Hat'
  WHEN 'Shorts' THEN
    SET type = 'Shorts'
  ELSE
    SET type = 'UNKNOWN'
  END CASE ;
  END
```

Usage

The **CASE** statement is a control statement that lets you choose a list of SQL statements to execute based on the value of an expression.

If a **WHEN** clause exists for the value of *value-expression*, the *statement-list* in the **WHEN** clause is executed. If no appropriate **WHEN** clause exists, and an **ELSE** clause exists, the *statement-list* in the **ELSE** clause is executed. Execution resumes at the first statement after the **END**.

Note: The ANSI standard allows two forms of **CASE** statements. Although SAP Sybase IQ allows both forms, when **CASE** is in the predicate, for best performance you must use the form shown here.

If you require the other form (also called ANSI syntax) for compatibility with SQL Anywhere, use this syntax:

```
CASE
   WHEN [ search-condition | NULL] THEN statement-list ...
   [ WHEN [ search-condition | NULL] THEN statement-list ] ...
   [ ELSE statement-list ]
   END [ CASE ]
```

With this ANSI syntax form, the statements are executed for the first satisfied search-condition in the **CASE** statement. The **ELSE** clause is executed if none of the *search-conditions* are met. If the expression can be NULL, use the following syntax for the first *search-condition*:

```
WHEN search-condition IS NULL THEN statement-list
```

Attention: Do not confuse the syntax of the **CASE** statement with that of the CASE expression.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

None

See also

- *BEGIN … END Statement* on page 81

CHECKPOINT Statement

Checkpoints the database.

Syntax

```
CHECKPOINT
```

Usage

CHECKPOINT forces the database server to execute a checkpoint. Checkpoints are also performed automatically by the database server according to an internal algorithm. Applications do not normally need to issue **CHECKPOINT**.

SAP Sybase IQ uses checkpoints differently than OLTP databases such as SQL Anywhere. OLTP databases tend to have short transactions that affect only a small number of rows. Writing entire pages to disk would be very expensive for them. Instead, OLTP databases generally write to disk at checkpoints, and write only the changed data rows. SAP Sybase IQ is an OLAP database. A single OLAP transaction can change thousands or millions of rows of data. For this reason, the database server does not wait for a checkpoint to occur to perform physical writes. It writes updated data pages to disk after each transaction commits. For an OLAP database, writing full pages of data to disk is much more effective than writing small amounts of data at arbitrary checkpoints.

Adjusting the checkpoint time or issuing explicit checkpoints may be unnecessary. Controlling checkpoints is less important in SAP Sybase IQ than in OLTP database products, because SAP Sybase IQ writes the actual data pages after each transaction commits.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

Requires the CHECKPOINT system privilege.

CLEAR Statement [Interactive SQL]

Closes any open result sets in Interactive SQL (**dbisql**).

Syntax

```
CLEAR
```

Usage

Closes any open result sets and leaves the contents of the SQL Statements pane unchanged

Side effects:

The **CLEAR** statement closes the cursor associated with the data being cleared.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *EXIT Statement [Interactive SQL]* on page 275

CLOSE Statement [ESQL] [SP]

Closes a cursor.

Syntax

```
CLOSE cursor-name
```

Parameters

- **cursor-name –** { *identifier* | *host-variable* }

Examples

- **Example 1 –** Close cursors in Embedded SQL:

```
EXEC SQL CLOSE employee_cursor;
EXEC SQL CLOSE :cursor_var;
```

- **Example 2 –** Use a cursor:

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35), OUT
TopValue INT)
BEGIN
  DECLARE err_notfound EXCEPTION
  FOR SQLSTATE '02000' ;
  DECLARE curThisCust CURSOR FOR
    SELECT CompanyName,
      CAST(       sum(SalesOrderItems.Quantity *
      Products.UnitPrice) AS INTEGER) VALUE
    FROM Customers
    LEFT OUTER JOIN SalesOrders
    LEFT OUTER JOIN SalesOrderItems
    LEFT OUTER JOIN Products
  GROUP BY CompanyName ;
  DECLARE ThisValue INT ;
  DECLARE ThisCompany CHAR(35) ;
  SET TopValue = 0 ;
  OPEN curThisCust ;
  CustomerLoop:
  LOOP
    FETCH NEXT curThisCust
    INTO ThisCompany, ThisValue ;
    IF SQLSTATE = err_notfound THEN
      LEAVE CustomerLoop ;
    END IF ;
    IF ThisValue > TopValue THEN
      SET TopValue = ThisValue ;
      SET TopCompany = ThisCompany ;
      END IF ;
   END LOOP CustomerLoop ;
   CLOSE curThisCust ;
END
```

Usage

This statement closes the named cursor.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

The cursor must have been previously opened.

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *OPEN Statement [ESQL] [SP]* on page 360
- *PREPARE Statement [ESQL]* on page 366

COMMENT Statement

Stores a comment, in the system tables, about a database object.

Syntax

```
COMMENT ON
    { COLUMN [ owner.]table-name.column-name
    | DBSPACE dbspace-name
    | EVENT event-name
    | EXTERNAL [ENVIRONMENT] OBJECT object-name
    | EXTERNAL ENVIRONMENT environment-name
    | EXTERNAL OBJECT object-name
    | FOREIGN KEY [owner.]table-name.role-name
    | INDEX [ [owner.]table.]index-name
    | INTEGRATED LOGIN integrated-login-id
    | JAVA CLASS java-class-name
    | JAVA JAR java-jar-name
    | KERBEROS LOGIN "client-Kerberos-principal"
    | LDAP SERVER ldap-server-name
    | LOGICAL SERVER logical-server-name
    | LOGIN POLICY policy-name
    | LS POLICY ls-policy-name
    | MATERIALIZED VIEW [owner.]materialized-view-name
    | PRIMARY KEY ON [owner.]table-name
    | PROCEDURE [owner.]table-name
    | ROLE role-name
    | SERVICE web-service-name
    | SEQUENCE [owner.]sequence-name
    | SPATIAL REFERENCE SYSTEM srs-name
    | SPATIAL UNIT OF MEASURE uom-identifier
    | TABLE [ owner.]table-name
    | TEXT CONFIGURATION [ owner.]text-config-name
    | TEXT INDEX text-index-name
    | TRIGGER [[owner.]table-name.]trigger-name
    | USER userid
    | VIEW [ owner.]view-name
}
 IS comment
```

Parameters

- **comment –** { *string* | **NULL** }
- **environment-name – JAVA | PERL | PHP | CLR | C_ESQL32 | C_ESQL64 | C_ODBC32 | C_ODBC64**

Applies to

Logical servers and logical server policies are multiplex only.

Examples

- **Example 1 –** adds a comment to the `Employees` table.

```
COMMENT
ON TABLE Employees
IS "Employee information"
```

- **Example 2 –** removes the comment from the `Employees` table.

```
COMMENT
ON TABLE Employees
IS NULL
```

Usage

The **COMMENT** statement updates remarks in the `ISYSREMARK` system table. You can remove a comment by setting it to NULL. The owner of a comment on an index or trigger is the owner of the table on which the index or trigger is defined.

The **COMMENT ON DBSPACE**, **COMMENT ON JAVA JAR**, and **COMMENT ON JAVA CLASS** statements allow you to set the Remarks column in the `SYS.ISYSREMARK` system table. Remove a comment by setting it to NULL.

You cannot add comments for local temporary tables.

Note: Materialized views are supported only for SQL Anywhere tables in the IQ catalog store.

Standards

- SQL – Vendor extension to ISO/ANSI SQL grammar.
- Sybase – Not supported by Adaptive Server Enterprise.

Permissions

Clause	Privilege Required
COLUMN	Any one of: • You own the table • CREATE ANY TABLE system privilege • ALTER ANY TABLE system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege

Clause	Privilege Required
DBSPACE	MANAGE ANY DBSPACE system privilege
EVENT	Any one of: • MANAGE ANY EVENT • CREATE ANY OBJECT • ALTER ANY OBJECT • COMMENT ANY OBJECT
EXTERNAL [ENVIRONMENT] OBJECT	MANAGE ANY EXTERNAL OBJECT system privilege
EXTERNAL ENVIRONMENT	MANAGE ANY EXTERNAL ENVIRONMENT system privilege
FOREIGN KEY	Any one of: • You own the table • CREATE ANY TABLE system privilege • ALTER ANY TABLE system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
INDEX	Any one of: • You own the index • CREATE ANY INDEX system privilege • ALTER ANY INDEX system privilege • COMMENT ANY OBJECT system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege
INTEGRATED LOGIN	MANAGE ANY USER system privilege
JAVA CLASS or JAVA JAR	MANAGE ANY EXTERNAL OBJECT system privilege
KERBEROS LOGIN	MANAGE ANY USER system privilege
LDAP SERVER	MANAGE ANY LDAP SERVER system privilege
LOGICAL SERVER	MANAGE MULTIPLEX system privilege
LOGIN POLICY	MANAGE ANY LOGIN POLICY system privilege
LS POLICY	MANAGE MULTIPLEX system privilege

Clause	Privilege Required
MATERIALIZE VIEW	Any one of: • You own the view • CREATE ANY MATERIALIZED VIEW system privilege • ALTER ANY MATERIALIZED VIEW system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
PRIMARY KEY ON	Any one of: • You own the table • CREATE ANY TABLE system privilege • ALTER ANY TABLE system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
PROCEDURE	Any one of: • You own the procedure • CREATE ANY PROCEDURE system privilege • ALTER ANY PROCEDURE system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
SEQUENCE	Any one of: • You own the sequence • CREATE ANY SEQUENCE system privilege • ALTER ANY SEQUENCE system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
SERVICE	MANAGE ANY WEB SERVICE system privilege
SPATIAL REFERENCE SYSTEM	Any one of: • COMMENT ANY OBJECT • CREATE ANY OBJECT • ALTER ANY OBJECT • MANAGE ANY SPATIAL OBJECT

Clause	Privilege Required
SPATIAL UNIT OF MEASURE	Any one of: • COMMENT ANY OBJECT • CREATE ANY OBJECT • ALTER ANY OBJECT • MANAGE ANY SPATIAL OBJECT
ROLE	System role – administrative privilege over the role being commented on. User-defined role – MANAGE ROLES system privilege or administrative privilege over the role being commented on.
TABLE	Any one of: • You own the table • CREATE ANY TABLE system privilege • ALTER ANY TABLE system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
TEXT CONFIGURATION	Any one of: • You created the text configuration • CREATE ANY TEXT CONFIGURATION system privilege • ALTER ANY TEXT CONFIGURATION system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
TEXT INDEX	Any one of: • You created the text index • CREATE ANY INDEX system privilege • ALTER ANY INDEX system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege

Clause	Privilege Required
TRIGGER	Any one of: • You created the trigger • CREATE ANY TRIGGER system privilege • ALTER ANY TRIGGER system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege
USER	MANAGE ANY USER system privilege
VIEW	Any one of: • You own the view • CREATE ANY VIEW system privilege • ALTER ANY VIEW system privilege • CREATE ANY OBJECT system privilege • ALTER ANY OBJECT system privilege • COMMENT ANY OBJECT system privilege

COMMIT Statement

Makes changes to the database permanent, or terminates a user-defined transaction.

Syntax

Syntax 1

```
COMMIT [ WORK ]
```

Syntax 2

```
COMMIT TRAN[SACTION ] [ transaction-name ]
```

Examples

- **Example 1 –** Commit the current transaction:

  ```
  COMMIT
  ```

- **Example 2 –** This Transact-SQL batch reports successive values of `@@trancount` as 0, 1, 2, 1, 0:

  ```
  PRINT @@trancount
  BEGIN TRANSACTION
  PRINT @@trancount
  BEGIN TRANSACTION
  PRINT @@trancount
  ```

```
COMMIT TRANSACTION
PRINT @@trancount
COMMIT TRANSACTION
PRINT @@trancount
go
```

Usage

- **Syntax 1 –** the **COMMIT** statement ends a transaction and makes all changes made during this transaction permanent in the database.

  Data definition statements carry out commits automatically. For information, see the *Side effects* listing for each SQL statement.

  COMMIT fails if the database server detects any invalid foreign keys. This makes it impossible to end a transaction with any invalid foreign keys. Usually, foreign key integrity is checked on each data manipulation operation. However, if the database option `WAIT_FOR_COMMIT` is set ON or a particular foreign key was defined with a **CHECK ON COMMIT** clause, the database server delays integrity checking until the **COMMIT** statement is executed.

- **Syntax 2 –** you can use **BEGIN TRANSACTION** and **COMMIT TRANSACTION** statements in pairs to construct nested transactions. Nested transactions are similar to savepoints. When executed as the outermost of a set of nested transactions, the statement makes changes to the database permanent. When executed inside a transaction, **COMMIT TRANSACTION** decreases the nesting level of transactions by one. When transactions are nested, only the outermost **COMMIT** makes the changes to the database permanent.

  The optional parameter *transaction-name* is the name assigned to this transaction. It must be a valid identifier. Use transaction names only on the outermost pair of nested **BEGIN/COMMIT** or **BEGIN/ROLLBACK** statements.

  You can use a set of options to control the detailed behavior of the **COMMIT** statement. See *COOPERATIVE_COMMIT_TIMEOUT Option*, *COOPERATIVE_COMMITS Option*, *DELAYED_COMMITS Option*, and *DELAYED_COMMIT_TIMEOUT Option*. You can use the **Commit** connection property to return the number of commits on the current connection.

Side effects:

- Closes all cursors except those opened **WITH HOLD**.
- Deletes all rows of declared temporary tables on this connection, unless they were declared using **ON COMMIT PRESERVE ROWS**.

Standards

- SQL—ISO/ANSI SQL compliant.

- Sybase—Supported by Adaptive Server Enterprise. Syntax 2 is a Transact-SQL extension to ISO/ANSI SQL grammar.

Permissions

Must be connected to the database.

See also

- *BEGIN TRANSACTION Statement [T-SQL]* on page 84
- *CONNECT Statement [ESQL] [Interactive SQL]* on page 101
- *DISCONNECT Statement [Interactive SQL]* on page 247
- *ROLLBACK Statement* on page 403
- *SAVEPOINT Statement* on page 406
- *SET CONNECTION Statement [ESQL] [Interactive SQL]* on page 420
- *COOPERATIVE_COMMIT_TIMEOUT Option* on page 496
- *COOPERATIVE_COMMITS Option* on page 497
- *DELAYED_COMMITS Option* on page 513
- *DELAYED_COMMIT_TIMEOUT Option* on page 513

CONFIGURE Statement [Interactive SQL]

Activates the Interactive SQL (**dbisql**) configuration window.

Syntax

```
CONFIGURE
```

Usage

The **dbisql** configuration window displays the current settings of all **dbisql** options. It does not display or let you modify database options.

If you select Permanent, the options are written to the `SYSOPTION` table in the database and the database server performs an automatic **COMMIT**. If you do not choose Permanent, and instead click OK, options are set temporarily and remain in effect for the current database connection only.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

None

See also

- *SET OPTION Statement* on page 422

CONNECT Statement [ESQL] [Interactive SQL]

Establishes a connection to a database.

Syntax

Syntax 1

```
CONNECT
… [ TO engine-name ]
…[ DATABASE database-name ]
…[ AS connection-name ]
…[ USER ] userid [ IDENTIFIED BY ]
```

Syntax 2

```
CONNECT USING connect-string
```

Parameters

- **engine-name –** identifier, string, or host-variable
- **database-name –** identifier, string, or host-variable
- **connection-name –** identifier, string, or host-variable
- **userid –** identifier, string, or host-variable
- **password –** identifier, string, or host-variable
- **connect-string –** a valid connection string or host-variable

Examples

- **Example 1 – CONNECT** usage within Embedded SQL:

```
EXEC SQL CONNECT AS :conn_name
USER :userid IDENTIFIED BY :password;
EXEC SQL CONNECT USER "dba" IDENTIFIED BY "sql";
```

- **Example 2 – CONNECT** usage from **dbisql**:
  - Connect to a database from **dbisql**. Prompts display for user ID and password:

```
CONNECT
```

  - Connect to the default database as DBA, from **dbisql**. A password prompt displays:

```
CONNECT USER "DBA"
```

- Connect to the demo database as the DBA, from **dbisql**:

```
CONNECT
TO <machine>_iqdemo
USER "DBA"
IDENTIFIED BY sql
```

where *<machine>_iqdemo* is the engine name.

- Connect to the demo database using a connect string, from **dbisql**:

```
CONNECT
USING 'UID=DBA;PWD=sql;DBN=iqdemo'
```

Usage

The **CONNECT** statement establishes a connection to the database identified by *database-name* running on the server identified by *engine-name*.

Embedded SQL behavior—In Embedded SQL, if no *engine-name* is specified, the default local database server is assumed (the first database server started). If no *database-name* is specified, the first database on the given server is assumed.

The **WHENEVER** statement, **SET SQLCA**, and some **DECLARE** statements do not generate code and thus might appear before the **CONNECT** statement in the source file. Otherwise, no statements are allowed until a successful **CONNECT** statement has been executed.

The user ID and password are used for permission checks on all dynamic SQL statements. By default, the password is case-sensitive; the user ID is not.

DBISQL behavior—If no database or server is specified in the **CONNECT** statement, **dbisql** remains connected to the current database, rather than to the default server and database. If a database name is specified without a server name, **dbisql** attempts to connect to the specified database on the current server. You must specify the database name defined in the **-n** database switch, not the database file name. If a server name is specified without a database name, **dbisql** connects to the default database on the specified server. For example, if this batch is executed while connected to a database, the two tables are created in the same database.

```
CREATE TABLE t1( c1 int );
CONNECT DBA IDENTIFIED BY sql;
CREATE TABLE t2 (c1 int );
```

No other database statements are allowed until a successful **CONNECT** statement has been executed.

The user ID and password are used for checking the permissions on SQL statements. If the password or the user ID and password are not specified, the user is prompted to type the missing information. By default, the password is case-sensitive; the user ID is not.

Multiple connections are managed through the concept of a current connection. After a successful connect statement, the new connection becomes the current one. To switch to a different connection, use **SET CONNECTION**. Executing a **CONNECT** statement does not close the existing connection (if any). Use **DISCONNECT** to drop connections.

Static SQL statements use the user ID and password specified with the *-l* option on the **SQLPP** statement line. If no *-l* option is given, then the user ID and password of the **CONNECT** statement are used for static SQL statements also.

In Embedded SQL, you can connect without a password by using a host variable for the password and setting the value of the host variable to be the null pointer.

AS clause—connection can optionally be named by specifying the **AS** clause. This allows multiple connections to the same database, or multiple connections to the same or different database servers, all simultaneously. Each connection has its own associated transaction. You might even get locking conflicts between your transactions if, for example, you try to modify the same record in the same database from two different connections.

Syntax 2—A *connect-string* is a list of parameter settings of the form **keyword**=*value*, and must be enclosed in single quotes.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Open Client Embedded SQL supports a different syntax for the **CONNECT** statement.

Permissions

None

See also

- *DISCONNECT Statement [Interactive SQL]* on page 247
- *GRANT CONNECT Statement* on page 298
- *SET CONNECTION Statement [ESQL] [Interactive SQL]* on page 420

CREATE DATABASE Statement

Creates a database consisting of several operating system files.

Syntax

```
CREATE DATABASE db-name
… [ [ TRANSACTION ] { LOG ON [ log-file-name ]
      [ MIRROR mirror-file-name ] } ]
… [ CASE { RESPECT | IGNORE } ]
… [ PAGE SIZE page-size ]
… [ COLLATION collation-label[( collation-tailoring-string ) ] ]
… [ ENCRYPTED [ TABLE ] {algorithm-key-spec | OFF } ]
… { … [ BLANK PADDING ON ]
… [ JCONNECT { ON | OFF } ]
… [ IQ PATH iq-file-name ]
… [ IQ SIZE iq-file-size ]
```

```
... [ IQ PAGE SIZE iq-page-size ]
... [ BLOCK SIZE block-size ]
... [ IQ RESERVE sizeMB ]
... [ TEMPORARY RESERVE sizeMB ]
... [ MESSAGE PATH message-file-name ]
... [ TEMPORARY PATH temp-file-name ]
... [ TEMPORARY SIZE temp-db-size ]
... [ DBA USER userid ]
... [ DBA PASSWORD password ]
... [ SYSTEM PROCEDURE AS DEFINER {ON | OFF} ]
```

Parameters

- **db-name | log-file-name | mirror-file-name | iq-file-name | message-file-name | temp-file-name –** '*file-name*'
- **page-size –** { **4096** | **8192** | **16384** | **32768** }
- **iq-page-size –** { **65536** | **131072** | **262144** | **524288** }
- **block-size –** { **4096** | **8192** | **16384** | **32768** }
- **collation-label –** *string*
- **collation-tailoring-string –** *keyword=value*
- **algorithm-key-spec – ON** | [**ON**] **KEY** *key* [**ALGORITHM** *AES-algorithm*] | [**ON**] **ALGORITHM** *AES-algorithm* **KEY** *key* | [**ON**] **ALGORITHM** '**SIMPLE**'
- **AES-algorithm –** '**AES**' | '**AES256**' | '**AES_FIPS**' | '**AES256_FIPS**'
- **key –** *quoted string*

Examples

- **Example 1 –** This Windows example creates an SAP Sybase IQ database named `mydb` with its corresponding `mydb.db`, `mydb.iq`, `mydb.iqtmp`, and `mydb.iqmsg` files in the `C:\s1\data` directory:

  ```
  CREATE DATABASE 'C:\\s1\\data\\mydb'
  BLANK PADDING ON
  IQ PATH 'C:\\s1\\data'
  IQ SIZE 2000
  IQ PAGE SIZE 65536
  ```

- **Example 2 –** This UNIX command creates an SAP Sybase IQ database with raw devices for **IQ PATH** and **TEMPORARY PATH**. The default IQ page size of 128KB applies.

  ```
  CREATE DATABASE '/s1/data/bigdb'
  IQ PATH '/dev/md/rdsk/bigdb'
  MESSAGE PATH '/s1/data/bigdb.iqmsg'
  TEMPORARY PATH '/dev/md/rdsk/bigtmp'
  ```

- **Example 3 –** This Windows command creates an SAP Sybase IQ database with a raw device for **IQ PATH**. Note the doubled backslashes in the raw device name (a Windows requirement):

  ```
  CREATE DATABASE 'company'
  IQ PATH '\\\\.\\E:'
  ```

```
JCONNECT OFF
IQ SIZE 40
```

- **Example 4 –** This UNIX example creates a strongly encrypted SAP Sybase IQ database using the AES encryption algorithm with the key “is!seCret.”

```
CREATE DATABASE 'marvin.db'
BLANK PADDING ON
CASE RESPECT
COLLATION 'ISO_BINENG'
IQ PATH '/filesystem/marvin.main1'
IQ SIZE 6400
IQ PAGE SIZE 262144
TEMPORARY PATH '/filesystem/marvin.temp1'
TEMPORARY SIZE 3200
ENCRYPTED ON KEY 'is!seCret' ALGORITHM 'AES'
```

Usage

Creates a database with the supplied name and attributes. The **IQ PATH** clause is required for creating the SAP Sybase IQ database; otherwise, you create a standard SQL Anywhere database.

If you omit the **IQ PATH** option, specifying any of these options generates an error: **IQ SIZE**, **IQ PAGE SIZE**, **BLOCK SIZE**, **MESSAGE PATH**, **TEMPORARY PATH**, and **TEMPORARY SIZE**.

When SAP Sybase IQ creates a database, it automatically generates four database files to store different types of data that constitute a database. Each file corresponds to a dbspace, the logical name by which SAP Sybase IQ identifies database files. The files are:

- *db-name.db* is the file that holds the catalog dbspace, `SYSTEM`. It contains the system tables and stored procedures describing the database and any standard SQL Anywhere database objects you add. If you do not include the `.db` extension, SAP Sybase IQ adds it. This initial dbspace contains the catalog store, and you can later add dbspaces to increase its size. It cannot be created on a raw partition.
- *db-name.iq* is the default name of the file that holds the main data dbspace, `IQ_SYSTEM_MAIN`, which contains the IQ tables and indexes. You can specify a different file name with the **IQ PATH** clause. This initial dbspace contains the IQ store.

  Warning! `IQ_SYSTEM_MAIN` is a special dbspace that contains all structures necessary for the database to open: the IQ db_identity blocks, the IQ checkpoint log, the IQ rollforward/rollback bitmaps of each committed transaction and each active checkpointed transaction, the incremental backup bitmaps, and the freelist root pages. `IQ_SYSTEM_MAIN` is always online when the database is open.

  The administrator can allow user tables to be created in `IQ_SYSTEM_MAIN`, especially if these tables are small, important tables. However, it is more common that immediately after creating the database, the administrator creates a second main dbspace, revokes create privilege in dbspace `IQ_SYSTEM_MAIN` from all users, grants create privilege on

the new main dbspace to selected users, and sets PUBLIC.default_dbspace to the new main dbspace.

- *db-name.iqtmp* is the default name of the file that holds the initial temporary dbspace, `IQ_SYSTEM_TEMP`. It contains the temporary tables generated by certain queries. The required size of this file can vary depending on the type of query and amount of data. You can specify a different name using the **TEMPORARY PATH** clause. This initial dbspace contains the temporary store.
- *db-name.iqmsg* is the default name of the file that contains the messages trace dbspace, `IQ_SYSTEM_MSG`. You can specify a different file name using the **MESSAGE PATH** clause.

In addition to these files, a database has a transaction log file (`db-name.log`), and might have a transaction log mirror file.

File names and the **CREATE DATABASE** statement:

The file names (*db-name*, *log-file-name*, *mirror-file-name*, *iq-file-name*, *message-file-name*, *temp-file-name*) are strings containing operating system file names. As literal strings, they must be enclosed in single quotes.

- In Windows, if you specify a path, any backslash characters (\) must be doubled if they are followed by an n or an x. This prevents them being interpreted as a newline character (\n) or as a hexadecimal number (\x), according to the rules for strings in SQL. It is safer to always double the backslash. For example:

```
CREATE DATABASE 'c:\\sybase\\mydb.db'
LOG ON 'e:\\logdrive\\mydb.log'
JCONNECT OFF
IQ PATH 'c:\\sybase\\mydb'
IQ SIZE 40
```

- If you specify no path, or a relative path:
  - The catalog store file (*db-name.db*) is created relative to the working directory of the server.
  - The IQ store, temporary store, and message log files are created in the same directory as, or relative to, the catalog store.

Relative path names are recommended.

Warning! The database file, temporary dbspace, and transaction log file must be located on the same physical machine as the database server. Do not place database files and transaction log files on a network drive. The transaction log should be on a separate device from its mirror, however.

On UNIX systems, you can create symbolic links, which are indirect pointers that contain the path name of the file to which they point. You can use symbolic links as relative path names. There are several advantages to creating a symbolic link for the database file name:

- Symbolic links to raw devices can have meaningful names, while the actual device name syntax can be obscure.
- A symbolic name might eliminate problems restoring a database file that was moved to a new directory since it was backed up.

To create a symbolic link, use the **ln -s** command. For example:

```
ln -s /disk1/company/iqdata/company.iq company_iq_store
```

Once you create this link, you can specify the symbolic link in commands like **CREATE DATABASE** or **RESTORE** instead of the fully qualified path name.

When you create a database or a dbspace, the path for every dbspace file must be unique. If your **CREATE DATABASE** command specifies the identical path and file name for these two stores, you receive an error.

You can create a unique path in any of these ways:

- Specify a different extension for each file (for example, `mydb.iq` and `mydb.iqtmp`)
- Specify a different file name (for example, `mydb.iq` and `mytmp.iq`)
- Specify a different path name (for example, `/iqfiles/main/iq` and `/iqfiles/temp/iq`) or different raw partitions
- Omit **TEMPORARY PATH** when you create the database. In this case, the temporary store is created in the same path as the catalog store, with the default name and extension `dbname.iqtmp`, where *dbname* is the database name.

Warning! On UNIX platforms, to maintain database consistency, you must specify file names that are links to different files. SAP Sybase IQ cannot detect the target where linked files point. Even if the file names in the command differ, make sure they do not point to the same operating system file.

Clauses and options of **CREATE DATABASE**:

TRANSACTION LOG—The transaction log is a file where the database server logs all changes made to the database. The transaction log plays a key role in system recovery. If you do not specify any **TRANSACTION LOG** clause, or if you omit a path for the file name, it is placed in the same directory as the `.db` file. However, you should place it on a different physical device from the `.db` and `.iq`. It cannot be created on a raw partition.

MIRROR—A transaction log mirror is an identical copy of a transaction log, usually maintained on a separate device, for greater protection of your data. By default, SAP Sybase IQ does not use a mirrored transaction log. If you do want to use a transaction log mirror, you must provide a file name. If you use a relative path, the transaction log mirror is created relative to the directory of the catalog store (`db-name.db`).

Tip: Always create a mirror copy of the transaction log.

CASE—For databases created with **CASE RESPECT**, all affected values are case-sensitive in comparisons and string operations. Database object names such as columns, procedures, or

user IDs, are unaffected. Dbspace names are always case-insensitive, regardless of the **CASE** specification.

The default (`RESPECT`) is that all comparisons are case-sensitive. **CASE RESPECT** provides better performance than **CASE IGNORE**.

Character strings inserted into tables are always stored in the case they are entered, regardless of whether the database is case-sensitive or not. If the string **Value** is inserted into a character data type column, the string is always stored in the database with an uppercase V and the remainder of the letters lowercase. **SELECT** statements return the string as **Value**. If the database is not case-sensitive, however, all comparisons make **Value** the same as **value**, **VALUE**, and so on. The SAP Sybase IQ server may return results in any combination of lowercase and uppercase, so you cannot expect case-sensitive results in a database that is case-insensitive (**CASE IGNORE**).

For example, given this table and data:

```
CREATE TABLE tb (id int NOT NULL,
                 string VARCHAR(30) NOT NULL);
INSERT INTO tb VALUES (1, 'ONE');
SELECT * FROM tb WHERE string = 'oNe';
```

The result of the **SELECT** can be "oNe" (as specified in the **WHERE** clause) and not necessarily "ONE" (as stored in the database).

Similarly, the result of:

```
SELECT * FROM tb WHERE string = 'One';
```

can be "One" and the result of:

```
SELECT * FROM tb WHERE string = 'ONe';
```

can be "ONe".

All databases are created with at least one user ID:

```
DBA
```

and password:

```
sql
```

In new databases, all passwords are case-sensitive, regardless of the case-sensitivity of the database. The user ID is unaffected by the **CASE RESPECT** setting.

PAGE SIZE —The page size for the SQL Anywhere segment of the database (containing the catalog tables) can be 4096, 8192, 16384, or 32768 bytes. Normally, use the default, 4096 (4KB). Large databases might need a larger page size than the default and may see performance benefits as a result. The smaller values might limit the number of columns your database can support. If you specify a page size smaller than 4096, SAP Sybase IQ uses a page size of 4096.

When you start a database, its page size cannot be larger than the page size of the current server. The server page size is taken from the first set of databases started or is set on the server command line using the **-gp** command line option.

Command line length for any statement is limited to the catalog page size. The 4KB default is large enough in most cases; however, in a few cases, a larger **PAGE SIZE** value is needed to accommodate very long commands, such as **RESTORE** commands that reference numerous dbspaces. A larger page size might also be needed to execute queries involving large numbers of tables or views.

Because the default catalog page size is 4KB, this is a problem only when the connection is to a database such as `utility_db`, which has a page size of 1024. This restriction may cause **RESTORE** commands that reference numerous dbspaces to fail. To avoid the problem, make sure the length of SQL command lines is less than the catalog page size.

Alternatively, start the engine with `-gp 32768` to increase catalog page size.

COLLATION—The collation sequence used for sorting and comparison of character data types in the database. The collation provides character comparison and ordering information for the encoding (character set) being used. If the **COLLATION** clause is not specified, SAP Sybase IQ chooses a collation based on the operating system language and encoding.

For most operating systems, the default collation sequence is ISO_BINENG, which provides the best performance. In ISO_BINENG, the collation order is the same as the order of characters in the ASCII character set. All uppercase letters precede all lowercase letters (for example, both ‘A’ and ‘B’ precede ‘a’).

You can choose the collation from a list of supported collations. For SQL Anywhere databases created on an SAP Sybase IQ server, the collation can also be the Unicode Collation Algorithm (UCA). If UCA is specified, also specify the **ENCODING** clause.

SAP Sybase IQ does not support any of the UCA-based collations for IQ databases. If a UCA-based collation is specified in the **CREATE DATABASE** statement for a database, the server returns the error `UCA collation is not supported` and database creation fails.

It is important to carefully choose your collation; it cannot be changed after the database is created.

Optionally, you can specify collation tailoring options (*collation-tailoring-string*) for additional control over the sorting and comparing of characters. These options take the form of keyword=value pairs, assembled in parentheses, following the collation name.

Note: Several collation tailoring options are supported when you specify the UCA collation for a SQL Anywhere database created on an SAP Sybase IQ server. For all other collations and for SAP Sybase IQ, only case sensitivity tailoring is supported. Also, databases created with collation tailoring options cannot be started using a pre-15.0 database server.

Collation tailoring options for SAP Sybase IQ contains the supported keyword, allowed alternate forms, and allowed values for the collation tailoring option (*collation-tailoring-string*) for an SAP Sybase IQ database.

Table 3. Collation Tailoring Option for SAP Sybase IQ

Keyword	Collation	Alternate forms	Allowed values
CaseSensitivity	All supported collations	CaseSensitive, Case	• **respect** Respect case differences between letters. For the UCA collation, this is equivalent to UpperFirst. For other collations, the value of respect depends on the collation itself. • **ignore** Ignore case differences between letters. • **UpperFirst** Always sort upper case first (Aa). • **LowerFirst** Always sort lowercase first (aA).

ENCRYPTED—Encryption makes the data stored in your physical database file unreadable. Use the **CREATE DATABASE ENCRYPTED** keyword without the **TABLE** keyword to encrypt the entire database. Use the **ENCRYPTED TABLE** clause to enable only table encryption for SQL Anywhere tables. Table-level encryption is not supported for SAP Sybase IQ tables. Enabling table encryption means that the tables that are subsequently created or altered using the **ENCRYPTED** clause are encrypted using the settings you specified at database creation.

There are two levels of database and table encryption: simple and strong.

- Simple encryption is equivalent to obfuscation. The data is unreadable, but someone with cryptographic expertise could decipher the data. For simple encryption, specify the **CREATE DATABASE** clause **ENCRYPTED ON ALGORITHM 'SIMPLE'**, **ENCRYPTED ALGORITHM 'SIMPLE'**, or specify the **ENCRYPTED ON** clause without specifying an algorithm or key.
- Strong encryption is achieved through the use of a 128-bit algorithm and a security key. The data is unreadable and virtually undecipherable without the key. For strong encryption, specify the **CREATE DATABASE** clause **ENCRYPTED ON ALGORITHM** with a 128-bit or 256-bit AES algorithm and use the **KEY** clause to specify an encryption key. You should choose a value for your key that is at least 16 characters long, contains a mix of uppercase and lowercase, and includes numbers, letters, and special characters.
  This encryption key is required each time you start the database.

Warning! Protect your encryption key! Store a copy of your key in a safe location. A lost key results in a completely inaccessible database from which there is no recovery.

You can specify encryption only during database creation. To introduce encryption to an existing database requires a complete unload, database re-creation, and reload of all data.

If the **ENCRYPTED** clause is used but no algorithm is specified, the default is AES. By default, encryption is OFF.

BLANK PADDING—By default, trailing blanks are ignored for comparison purposes (`BLANK PADDING` ON), and Embedded SQL programs pad strings that are fetched into character arrays. This option is provided for compatibility with the ISO/ANSI SQL standard.

For example, these two strings are treated as equal in a database created with `BLANK PADDING` ON:

```
'Smith'
'Smith   '
```

Note: CREATE DATABASE no longer supports `BLANK PADDING` OFF.

JCONNECT—To use the SAP Sybase jConnect for JDBC driver to access system catalog information, install jConnect support. Set **JCONNECT** to **OFF** to exclude the jConnect system objects (the default is **ON**). You can still use JDBC, as long as you do not access system information.

IQ PATH—The path name of the main segment file containing the SAP Sybase IQ data. You can specify an operating system file or a raw partition of an I/O device. (The *Installation and Configuration Guide guide* for your platform describes the format for specifying a raw partition.) SAP Sybase IQ automatically detects which type based on the path name you specify. If you use a relative path, the file is created relative to the directory of the catalog store (the `.db` file).

IQ SIZE—The size in MB of either the raw partition or the operating system file you specify with the **IQ PATH** clause. For raw partitions, you should always take the default by not specifying **IQ SIZE**, which allows SAP Sybase IQ to use the entire raw partition; if you specify a value for **IQ SIZE**, the value must match the size of the I/O device or SAP Sybase IQ returns an error. For operating system files, you can specify a value from the minimum in the following table up to a maximum of 4TB.

The default size for an operating system file depends on **IQ PAGE SIZE**:

Table 4. Default and Minimum Sizes of IQ and Temporary Store Files

IQ PAGE SIZE	IQ SIZE default	TEMPORARY SIZE default	Minimum explicit IQ SIZE	Minimum explicit TEMPORARY SIZE
65536	4096000	2048000	4MB	2MB
131072	8192000	4096000	8MB	4MB
262144	16384000	8192000	16MB	8MB
524288	32768000	16384000	32MB	16MB

IQ PAGE SIZE—The page size, in bytes, for the SAP Sybase IQ segment of the database (containing the IQ tables and indexes). The value must be a power of 2, from 65536 to 524288 bytes. The default is 131072 (128KB). Other values for the size are changed to the next larger

size. The IQ page size determines the default I/O transfer block size and maximum data compression for your database.

For the best performance, use these minimum page sizes:

- 64KB (**IQ PAGE SIZE 65536**) for databases whose largest table contains up to 1 billion rows, or a total size less than 8TB. This is the absolute minimum for a new database. On 32-bit platforms, a 64KB IQ page size gives the best performance.
- 128KB (**IQ PAGE SIZE 131072**) for databases on a 64-bit platform whose largest table contains more than 1 billion rows and fewer than 4 billion rows, or might grow to a total size of 8TB or greater. 128KB is the default IQ page size.
- 256KB (**IQ PAGE SIZE 262144**) for databases on a 64-bit platform whose largest table contains more than 4 billion rows, or might grow to a total size of 8TB or greater.

Very wide tables, such as tables with multiple columns of wide `VARCHAR` data (columns from 255 to 32,767 bytes) might need the next larger **IQ PAGE SIZE**.

BLOCK SIZE—The I/O transfer block size, in bytes, for the SAP Sybase IQ segment of the database. The value must be less than **IQ PAGE SIZE**, and must be a power of two between 4096 and 32768. Other values for the size are changed to the next larger size. The default value depends on the value of the **IQ PAGE SIZE** clause. For most applications, the default value is optimum.

IQ RESERVE—Specifies the size, in megabytes, of space to reserve for the main IQ store (`IQ_SYSTEM_MAIN` dbspace), so that the dbfile can be increased in size in the future. The *sizeMB* parameter can be any number greater than 0. You cannot change the reserve after the dbspace is created.

When **IQ RESERVE** is specified, the database uses more space for internal (free list) structures. If reserve size is too large, the space needed for the internal structures can be larger than the specified size, which results in an error.

TEMPORARY RESERVE clause—Specifies the size, in megabytes, of space to reserve for the temporary IQ store (`IQ_SYSTEM_TEMP` dbspace), so that the dbfile can be increased in size in the future. The *sizeMB* parameter can be any number greater than 0. You cannot change the reserve after the dbspace is created.

When **TEMPORARY RESERVE** is specified, the database uses more space for internal (free list) structures. If reserve size is too large, the space needed for the internal structures can be larger than the specified size, which results in an error.

Note: Reserve and mode for temporary dbspaces are lost if the database is restored from a backup.

MESSAGE PATH—The path name of the segment containing the SAP Sybase IQ messages trace file. You must specify an operating system file; the message file cannot be on a raw partition. If you use a relative path or omit the path, the message file is created relative to the directory of the `.db` file.

TEMPORARY PATH—The path name of the temporary segment file containing the temporary tables generated by certain queries. You can specify an operating system file or a raw partition of an I/O device. (The *Installation and Configuration Guide* guide for your platform describes the format for specifying a raw partition.) SAP Sybase IQ automatically detects which type based on the path name you specify. If you use a relative path or omit the path, the temporary file is created relative to the directory of the `.db` file.

TEMPORARY SIZE—The size, in megabytes, of either the raw partition or the operating system file you specify with the **TEMPORARY PATH** clause. For raw partitions, always use the default by not specifying **TEMPORARY SIZE**, which allows SAP Sybase IQ to use the entire raw partition. The default for operating system files is always one-half the value of **IQ SIZE**. If the IQ store is on a raw partition and the temporary store is an operating system file, the default **TEMPORARY SIZE** is half the size of the IQ store raw partition.

DBA USER—The user name for the default user account granted the SYS_AUTH_DBA_ROLE system role. If you do not specify this clause, SAP Sybase IQ creates a default `dba` user ID.

DBA PASSWORD—The password for the default user account granted the SYS_AUTH_DBA_ROLE system role.

SYSTEM PROCEDURE AS DEFINER—Defines whether a privileged system procedure runs with the privileges of the invoker (the person executing the procedure) or the definer (the owner of the procedure).

- **OFF** (default), or not specified means all privileged system procedures execute with the privileges of the invoker. Use **sp_proc_priv()** to identify the system privileges required to run a system procedure.
- **ON** means:
  - pre-16.0 privileged system procedures execute with the privileges of the definer.
  - 16.0 or later privileged system procedures execute with the privileges of the invoker.

Side effects:

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Adaptive Server Enterprise provides a **CREATE DATABASE** statement, but with different options.

Permissions

The permissions required to execute this statement are set using the **-gu** server command line option, as follows:

- **NONE –** No user can issue this statement.
- **DBA –** Requires the SERVER OPERATOR system privilege.
- **UTILITY_DB –** Only those users who can connect to the `utility_db` database can issue this statement.

The account under which the server is running must have write permissions on the directories where files are created.

See also

- *CREATE DBSPACE Statement* on page 114
- *DROP DATABASE Statement* on page 252

CREATE DBSPACE Statement

Creates a new dbspace and the associated dbfiles for the IQ main store, catalog store, or RLV store.

Syntax

Syntax 1

Use for catalog store dbspaces only (SQL Anywhere (SA) dbspaces).

```
CREATE DBSPACE dbspace-name AS file-path CATALOG STORE
```

Syntax 2

Use for IQ main store dbspaces.

```
CREATE DBSPACE dbspace-name USING file-specification
[ IQ STORE ] iq-dbspace-opts
```

Syntax 3

Use for RLV dbspaces.

```
CREATE DBSPACE dbspace-name USING file-specification
RLV STORE
```

Parameters

- **file-specification –** { *single-path-spec* | *new-file-spec* [, ...] }
- **single-path-spec –** *'file-path'* | *iq-file-opts*
- **new-file-spec – FILE** *logical-file-name* | *'file-path' iq-file-opts*
- **iq-file-opts –** [[**SIZE**] *file-size*] …[**KB** | **MB** | **GB** | **TB**]] [**RESERVE** *size* …[**KB** | **MB** | **GB** | **TB**]]
- **iq-dbspace-opts –** [**STRIPING**] {ON | OFF}] …[**STRIPESIZEKB** *sizeKB*]

Examples

- **Example 1 –** Create a dbspace called `DspHist` for the IQ main store with two files on a UNIX system. Each file is 1GB in size and can grow 500MB:

```
CREATE DBSPACE DspHist USING FILE
FileHist1 '/History1/data/file1'
SIZE 1000 RESERVE 500,
FILE FileHist2 '/History1/data/file2'
SIZE 1000 RESERVE 500;
```

- **Example 2 –** Create a second catalog dbspace called `DspCat2`:

```
CREATE DBSPACE DspCat2 AS
'catalog_file2'
CATALOG STORE;
```

- **Example 3 –** Creates an IQ main dbspace called `EmpStore1` for the IQ store (three alternate syntax examples):

```
CREATE DBSPACE EmpStore1
USING FILE EmpStore1
'EmpStore1.IQ' SIZE 8 MB IQ STORE;
```

```
CREATE DBSPACE EmpStore1
USING FILE EmpStore1
'EmpStore1.IQ' 8 IQ STORE;
```

```
CREATE DBSPACE EmpStore1
USING FILE EmpStore1
'EmpStore1.IQ' 8;
```

- **Example 4 –** Creates a RLV store dbspace called d1:

```
CREATE DBSPACE d1
USING FILE f1
'f1.iq' SIZE 100 RLV STORE;
```

Usage

CREATE DBSPACE creates a new dbspace for the IQ main store, catalog store, or RLV store. The dbspace you add can be on a different disk device than the initial dbspace, allowing you to create stores that are larger than one physical device.

`Syntax 1` creates a dbspace for the catalog store, where both dbspace and dbfile have the same logical name. Each dbspace in the catalog store has a single file.

`new-file-spec` creates a dbspace for the IQ main store. You can specify one or more dbfiles for the IQ main store. The dbfile name and physical file path are required for each file, and must be unique.

The dbspace name and dbfile names are always case-insensitive. The physical file paths have the case sensitivity of the operating system if the database is **CASE RESPECT**, and are case-insensitive if the database is **CASE IGNORE**.

You cannot create a dbspace for an IQ temporary store. A single temporary dbspace, `IQ_SYSTEM_TEMP`, is created when you create a new database or upgrade one that was

created in a version earlier than SAP Sybase IQ 15.3. You can add additional files to the IQ_SYSTEM_TEMP dbspace using the **ALTER DBSPACE ADD FILE** syntax.

Note: Creating a RLV dbspace containing a minimum of one file is a prerequisite for RLV storage. Before enabling RLV storage on a simplex server, check that the RLV dbspace exists.

RESERVE clause—Specifies the size in kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB) of space to reserve, so that the dbspace can be increased in size in the future. The *size* parameter can be any number greater than 0; megabytes is the default. You cannot change the reserve after the dbspace dbfile is created.

When **RESERVE** is specified, the database uses more space for internal (free list) structures. If reserve size is too large, the space needed for the internal structures can be larger than the specified size, which results in an error.

You can create a unique path in any of these ways:

- Specify a different extension for each file (for example, `mydb.iq`)
- Specify a different file name (for example, `mydb2.iq`)
- Specify a different path name (for example, `/iqfiles/main/iq`) or different raw partitions

Warning! On UNIX platforms, to maintain database consistency, specify file names that are links to different files. SAP Sybase IQ cannot detect the target where linked files point. Even if the file names in the command differ, make sure they do not point to the same operating system file.

dbspace-name and *dbfile-name* are internal names for dbspaces and dbfiles. *filepath* is the actual operating system file name of the dbfile, with a preceding path where necessary. `filepath` without an explicit directory is created in the same directory as the catalog store of the database. Any relative directory is relative to the catalog store.

SIZE clause—Specifies the size, from 0 to 4 terabytes, of the operating system file specified in *filepath*. The default depends on the store type and block size. For the IQ main store, the default number of bytes equals 1000* the block size. You cannot specify the **SIZE** clause for the catalog store.

A **SIZE** value of 0 creates a dbspace of minimum size, which is 8MB for the IQ main store.

For raw partitions, do not explicitly specify **SIZE**. SAP Sybase IQ automatically sets this parameter to the maximum raw partition size, and returns an error if you attempt to specify another size.

STRIPESIZEKB clause—Specifies the number of kilobytes (KB) to write to each file before the disk striping algorithm moves to the next stripe for the specified dbspace.

If you do not specify striping or stripe size, the default values of the options DEFAULT_DISK_STRIPING and DEFAULT_KB_PER_STRIPE apply.

A database can have as many as (32KB - 1) dbspaces, including the initial dbspaces created when you create the database. However, your operating system might limit the number of files per database.

Side effects:

- Automatic commit
- Automatic checkpoint.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY DBSPACE system privilege.

See also

- *CREATE DATABASE Statement* on page 103
- *DROP Statement* on page 248

CREATE DOMAIN Statement

Creates a user-defined data type in the database.

Syntax

```
CREATE { DOMAIN | DATATYPE } domain-name data-type
… [ NOT ] NULL ]
… [ DEFAULT default-value ]
```

Parameters

- **domain-name –** identifier
- **data-type –** built-in data type, with precision and scale
- **default-value –** *special-value* | *string* | *global variable* | [-] *number* | (*constant-expression*) | *built-in-function*(*constant-expression*) | **AUTOINCREMENT** | **CURRENT DATABASE** | **CURRENT REMOTE USER** | **NULL** | **TIMESTAMP** | **LAST USER**
- **special-value – CURRENT** { **DATE** | **TIME** | **TIMESTAMP** | **USER** | **PUBLISHER** } | **USER**

Examples

- **Example 1 –** Create a data type named **address**, which holds a 35-character string, and which may be NULL:

```
CREATE DOMAIN address CHAR( 35 ) NULL
```

Usage

User-defined data types are aliases for built-in data types, including precision and scale values, where applicable. They improve convenience and encourage consistency in the database.

Note: Use **CREATE DOMAIN**, rather than **CREATE DATATYPE**, as **CREATE DOMAIN** is the ANSI/ISO SQL3 term.

The user who creates a data type is automatically made the owner of that data type. No owner can be specified in the **CREATE DATATYPE** statement. The user-defined data type name must be unique, and all users can access the data type without using the owner as prefix.

User-defined data types are objects within the database. Their names must conform to the rules for identifiers. User-defined data type names are always case-insensitive, as are built-in data type names.

By default, user-defined data types allow NULLs unless the **allow_nulls_by_default** option is set to OFF. In this case, new user-defined data types by default do not allow NULLs. The nullability of a column created on a user-defined data type depends on the setting of the definition of the user-defined data type, not on the setting of the **allow_nulls_by_default** option when the column is referenced. Any explicit setting of NULL or NOT NULL in the column definition overrides the user-defined data type setting.

The **CREATE DOMAIN** statement allows you to specify DEFAULT values on user-defined data types. The DEFAULT value specification is inherited by any column defined on the data type. Any DEFAULT value explicitly specified on the column overrides that specified for the data type.

The **CREATE DOMAIN** statement lets you incorporate a rule, called a CHECK condition, into the definition of a user-defined data type.

SAP Sybase IQ enforces CHECK constraints for base, global temporary. local temporary tables, and user-defined data types.

To drop the data type from the database, use the **DROP** statement. You must be either the owner of the data type or have the CREATE DATATYPE or CREATE ANY OBJECT system privilege in order to drop a user-defined data type.

Side effects:

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.

- Sybase—Not supported by Adaptive Server Enterprise. Transact-SQL provides similar functionality using the **sp_addtype** system procedure and the **CREATE DEFAULT** and **CREATE RULE** statements.

Permissions

Requires one of:

- CREATE DATATYPE system privilege.
- CREATE ANY OBJECT system privilege.

See also

- *DROP Statement* on page 248

CREATE EVENT Statement

Defines an event and its associated handler for automating predefined actions. Also defines scheduled actions.

Syntax

```
CREATE EVENT event-name
[ TYPE event-type
        [ WHERE trigger-condition [ AND trigger-condition ], ...]
    | SCHEDULE schedule-spec, … ]
…[ ENABLE | DISABLE ]
…[ AT { CONSOLIDATED | REMOTE | ALL } ]
…[ HANDLER
       BEGIN
…
   END ]
```

Parameters

- **event-type – BackupEnd | "Connect"** | **ConnectFailed** | **DatabaseStart** | **DBDiskSpace** | **"Disconnect"** | **GlobalAutoincrement** | **GrowDB** | **GrowLog** | **GrowTemp | IQMainDBSpaceFree** | **IQTempDBSpaceFree** | **LogDiskSpace** | **"RAISERROR"** | **ServerIdle** | **TempDiskSpace**
- **trigger-condition – event_condition**(*condition-name*) { **=** | **<** | **>** | **!=** | **<=** | **>=** } *value*
- **schedule-spec –** [*schedule-name*] { **START TIME** *start-time* | **BETWEEN** *start-time* **AND** *end-time* } [**EVERY** *period* { **HOURS** | **MINUTES** | **SECONDS** }] [**ON** { (*day-of-week*, …) | (*day-of-month*, …) }] [**START DATE** *start-date*]
- **event-name | schedule-name –** *identifier*
- **day-of-week –** *string*
- **day-of-month | value | period –** *integer*

- **start-time | end-time –** *time*
- **start-date –** *date*

Examples

- **Example 1 –** Instruct the database server to carry out an automatic incremental backup daily at 1 a.m.:

```
CREATE EVENT IncrementalBackup
SCHEDULE
START TIME '1:00AM' EVERY 24 HOURS
HANDLER
  BEGIN
    BACKUP DATABASE INCREMENTAL
    TO 'backups/daily.incr'
  END
```

- **Example 2 –** Instruct the database server to call the system stored procedure **sp_iqspaceused** every 10 minutes, then store in a table the returned current date and time, the current number of connections to the database, and current information about the use of main and temporary IQ store:

```
CREATE TABLE mysummary(dt DATETIME,
  users INT, mainKB UNSIGNED BIGINT,
  mainPC UNSIGNED INT,
  tempKB UNSIGNED BIGINT,
  tempPC UNSIGNED INT) ;
```

```
CREATE EVENT mysummary
  SCHEDULE sched_mysummary
    START TIME '00:01 AM' EVERY 10 MINUTES
  HANDLER
  BEGIN
    DECLARE mt UNSIGNED BIGINT;
    DECLARE mu UNSIGNED BIGINT;
    DECLARE tt UNSIGNED BIGINT;
    DECLARE tu UNSIGNED BIGINT;
    DECLARE conncount UNSIGNED INT;

    SET conncount = DB_PROPERTY('ConnCount');
    CALL SP_IQSPACEUSED(mt,mu,tt,tu);

        INSERT INTO mysummary VALUES( NOW(),
    conncount, mu, (mu*100)/mt, tu,
    (tu*100)/tt );
    END;
```

- **Example 3 –** Post a message to the server log when free disk space on the device containing the transaction log file falls below 30 percent, but execute the handler no more than once every 300 seconds.

```
CREATE EVENT LowTxnLogDiskSpace
TYPE DBDiskSpace
WHERE event_condition( 'DBFreePercent' ) < 30
AND event_condition( 'Interval' ) >= 300
```

```
HANDLER
BEGIN
message 'Disk space for Transaction Log is low.';
END;
```

Usage

Events can be used in two main ways:

- Scheduling actions – the database server carries out a set of actions on a schedule of times. You can use this capability to schedule backups, validity checks, queries to fill up reporting tables, and so on.
- Event handling actions – the database server carries out a set of actions when a predefined event occurs. The events that can be handled include disk space restrictions (when a disk fills beyond a specified percentage), when the server is idle, and so on.

An event definition includes two distinct pieces. The trigger condition can be an occurrence, such as a disk filling up beyond a defined threshold. A schedule is a set of times, each of which acts as a trigger condition. When a trigger condition is satisfied, the event handler executes. The event handler includes one or more actions specified inside a compound statement (**BEGIN... END**).

If no trigger condition or schedule specification is supplied, only an explicit **TRIGGER EVENT** statement can trigger the event. During development, you might want to develop and test event handlers using **TRIGGER EVENT** and add the schedule or **WHERE** clause once testing is complete.

Event errors are logged to the database server console.

When event handlers are triggered, the server makes context information, such as the connection ID that caused the event to be triggered, available to the event handler using the **EVENT_PARAMETER** function.

Note: Although statements that return result sets are disallowed in events, you can allow an event to call a stored procedure and insert the procedure results into a temporary table.

CREATE EVENT – *event-name* is an identifier. An event has a creator, which is the user creating the event, and the event handler executes with the permissions of that creator. This is the same as stored procedure execution. You cannot create events owned by other users.

You can list event names by querying the system table `SYSEVENT`. For example:

```
SELECT event_id, event_name FROM SYS.SYSEVENT
```

TYPE – *event-type* is one of the listed set of system-defined event types. The event types are case-insensitive. To specify the conditions under which this *event-type* triggers the event, use the **WHERE** clause.

- DiskSpace event types—If the database contains an event handler for one of the DiskSpace types, the database server checks the available space on each device associated with the relevant file every 30 seconds.

In the event the database has more than one dbspace, on separate drives, **DBDiskSpace** checks each drive and acts depending on the lowest available space.

The **LogDiskSpace** event type checks the location of the transaction log and any mirrored transaction log, and reports based on the least available space.

- Globalautoincrement event type—This event fires when the GLOBAL AUTOINCREMENT default value for a table is within one percent of the end of its range. A typical action for the handler could be to request a new value for the **GLOBAL_DATABASE_ID** option.

  You can use the **EVENT_CONDITION** function with **RemainingValues** as an argument for this event type.
- ServerIdle event type—If the database contains an event handler for the **ServerIdle** type, the server checks for server activity every 30 seconds.

WHERE Clause – the trigger condition determines the condition under which an event is fired. For example, to take an action when the disk containing the transaction log becomes more than 80% full, use this triggering condition:

```
...
WHERE event_condition( 'LogDiskSpacePercentFree' ) < 20
...
```

The argument to the **EVENT_CONDITION** function must be valid for the event type.

You can use multiple **AND** conditions to make up the **WHERE** clause, but you cannot use **OR** conditions or other conditions.

SCHEDULE – specifies when scheduled actions are to take place. The sequence of times acts as a set of triggering conditions for the associated actions defined in the event handler.

You can create more than one schedule for a given event and its associated handler. This permits complex schedules to be implemented. While it is compulsory to provide a schedule name when there is more than one schedule, it is optional if you provide only a single schedule.

You can list schedule names by querying the system table `SYSSCHEDULE`. For example:

```
SELECT event_id, sched_name FROM SYS.SYSSCHEDULE
```

Each event has a unique event ID. Use the `event_id` columns of `SYSEVENT` and `SYSSCHEDULE` to match the event to the associated schedule.

When a nonrecurring scheduled event has passed, its schedule is deleted, but the event handler is not deleted.

Scheduled event times are calculated when the schedules are created, and again when the event handler completes execution. The next event time is computed by inspecting the schedule or schedules for the event, and finding the next schedule time that is in the future. If an event handler is instructed to run every hour between 9:00 and 5:00, and it takes 65 minutes to execute, it runs at 9:00, 11:00, 1:00, 3:00, and 5:00. If you want execution to overlap, you must create more than one event.

The subclauses of a schedule definition are as follows:

- START TIME – the first scheduled time for each day on which the event is scheduled. If a **START DATE** is specified, the **START TIME** refers to that date. If no **START DATE** is specified, the **START TIME** is on the current day (unless the time has passed) and each subsequent day.
- BETWEEN … AND – a range of times during the day outside of which no scheduled times occur. If a **START DATE** is specified, the scheduled times do not occur until that date.
- EVERY – an interval between successive scheduled events. Scheduled events occur only after the **START TIME** for the day, or in the range specified by **BETWEEN …AND**.
- ON – a list of days on which the scheduled events occur. The default is every day. These can be specified as days of the week or days of the month.

  Days of the week are Monday, Tuesday, and so on. The abbreviated forms of the day, such as Mon, Tue, and so on, may also be used. The database server recognizes both full-length and abbreviated day names in any of the languages supported by SAP Sybase IQ.

  Days of the month are integers from 0 to 31. A value of 0 represents the last day of any month.
- START DATE – the date on which scheduled events are to start occurring. The default is the current date.

Each time a scheduled event handler is completed, the next scheduled time and date is calculated.

1. If the **EVERY** clause is used, find whether the next scheduled time falls on the current day, and is before the end of the **BETWEEN …AND** range. If so, that is the next scheduled time.
2. If the next scheduled time does not fall on the current day, find the next date on which the event is to be executed.
3. Find the **START TIME** for that date, or the beginning of the **BETWEEN … AND** range.

ENABLE | DISABLE – by default, event handlers are enabled. When **DISABLE** is specified, the event handler does not execute even when the scheduled time or triggering condition occurs. A **TRIGGER EVENT** statement does not cause a disabled event handler to be executed.

AT – to execute events at remote or consolidated databases in a SQL Remote setup, use this clause to restrict the databases at which the event is handled. By default, all databases execute the event.

HANDLER – each event has one handler. Like the body of a stored procedure, the handler is a compound statement. There are some differences, though: you can use an **EXCEPTION** clause within the compound statement to handle errors, but not the **ON EXCEPTION RESUME** clause provided within stored procedures.

Side Effects:

- Automatic commit.
- The actions of an event handler are committed if no error is detected during execution, and rolled back if errors are detected.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires one of:

- MANAGE ANY EVENT system privilege.
- CREATE ANY OBJECT system privilege.

Event handlers execute on a separate connection, with the privileges of the event owner. To execute with privileges other than MANAGE ANY EVENT system privilege, you can call a procedure from within the event handler: the procedure executes with the permissions of its owner. The separate connection does not count towards the ten-connection limit of the personal database server.

See also

- *ALTER EVENT Statement* on page 14
- *BEGIN … END Statement* on page 81
- *COMMENT Statement* on page 93
- *DROP Statement* on page 248
- *TRIGGER EVENT Statement* on page 434

CREATE EXISTING TABLE Statement

Creates a new proxy table that represents an existing table on a remote server.

Syntax

```
CREATE EXISTING TABLE [owner.]table_name
[ ( column-definition, … ) ]
AT 'location-string'
```

Parameters

- **column-definition –** *column-name data-type* [**NOT NULL**]
- **location-string –** *remote-server-name*.[*db-name*].[*owner*].*object-name* | *remote-server-name*;[*db-name*];[*owner*];*object-name*

Examples

- **Example 1 –** Create a proxy table named `nation` for the `nation` table at the remote server `server_a`:

```
CREATE EXISTING TABLE nation
( n_nationkey int,
  n_name char(25),
  n_regionkey int,
  n_comment char(152))
AT 'server_a.db1.joe.nation'
```

- **Example 2 –** Create a proxy table named `blurbs` for the `blurbs` table at the remote server `server_a`. SAP Sybase IQ derives the column list from the metadata it obtains from the remote table:

```
CREATE EXISTING TABLE blurbs
AT 'server_a.db1.joe.blurbs'
```

- **Example 3 –** Create a proxy table named `rda_employee` for the `Employees` table at the SAP Sybase IQ remote server `remote_iqdemo_srv`:

```
CREATE EXISTING TABLE rda_employee
AT 'remote_iqdemo_srv..dba.Employees'
```

Usage

CREATE EXISTING TABLE is a variant of the **CREATE TABLE** statement. The **EXISTING** keyword is used with **CREATE TABLE** to specify that a table already exists remotely, and that its metadata is to be imported into SAP Sybase IQ. This establishes the remote table as a visible entity to its users. SAP Sybase IQ verifies that the table exists at the external location before it creates the table.

Tables used as proxy tables cannot have names longer than 30 characters.

If the object does not exist (either as a host data file or remote server object), the statement is rejected with an error message.

Index information from the host data file or remote server table is extracted and used to create rows for the system table sysindexes. This defines indexes and keys in server terms and enables the query optimizer to consider any indexes that might exist on this table.

Referential constraints are passed to the remote location when appropriate.

If you do not specify column definitions, SAP Sybase IQ derives the column list from the metadata it obtains from the remote table. If you do specify column definitions, SAP Sybase IQ verifies them. When SAP Sybase IQ checks column names, data types, lengths, and null properties:

- Column names must match identically (although case is ignored).
- Data types in **CREATE EXISTING TABLE** must match or be convertible to the data types of the column on the remote location. For example, a local column data type is defined as `NUMERIC`, whereas the remote column data type is `MONEY`. You may encounter some errors, if you select from a table in which the data types do not match or other inconsistencies exist.

- Each column's NULL property is checked. If the local column's NULL property is not identical to the remote column's NULL property, a warning message is issued, but the statement is not aborted.
- Each column's length is checked. If the lengths of `CHAR`, `VARCHAR`, `BINARY`, `DECIMAL`, and `NUMERIC` columns do not match, a warning message is issued, but the command is not aborted. You might choose to include only a subset of the actual remote column list in your **CREATE EXISTING** statement.
- **AT** specifies the location of the remote object. The **AT** clause supports the semicolon (;) as a delimiter. If a semicolon is present anywhere in the location string, the semicolon is the field delimiter. If no semicolon is present, a period is the field delimiter. This allows you to use file names and extensions in the database and owner fields. Semicolon field delimiters are used primarily with server classes that are not currently supported; however, you can also use them where a period would also work as a field delimiter. For example, this statement maps the table `proxy_a1` to the SQL Anywhere database `mydb` on the remote server `myasa`:

```
CREATE EXISTING TABLE
proxy_a1
AT 'myasa;mydb;;a1'
```

In a simplex environment, you cannot create a proxy table that refers to a remote table on the same node. In a multiplex environment, you cannot create a proxy table that refers to the remote table defined within the multiplex.

For example, in a simplex environment, if you try to create proxy table `proxy_e`, which refers to base table `Employees` defined on the same node, the **CREATE EXISTING TABLE** statement is rejected with an error message. In a multiplex environment, the **CREATE EXISTING TABLE** statement is rejected if you create proxy table `proxy_e` from any node (coordinator or secondary) that refers to remote table `Employees` defined within a multiplex.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

For table to be owned by self – Requires one of:

- CREATE ANY TABLE system privilege.
- CREATE ANY OBJECT system privilege.

For table to be owned by any user – Requires the CREATE ANY TABLE system privilege.

See also

- *CREATE TABLE Statement* on page 197

CREATE EXTERNLOGIN Statement

Assigns an alternate login name and password to be used when communicating with a remote server.

Syntax

```
CREATE EXTERNLOGIN login-name
TO remote-server
REMOTE LOGIN remote-user
[ IDENTIFIED BY remote-password ]
```

Examples

- **Example 1 –** Map the local user named **DBA** to the user **sa** with password 4TKNOX when connecting to the server **sybase1**:

```
CREATE EXTERNLOGIN dba
TO sybase1
REMOTE LOGIN sa
IDENTIFIED BY 4TKNOX
```

Usage

Changes made by **CREATE EXTERNLOGIN** do not take effect until the next connection to the remote server.

By default, SAP Sybase IQ uses the names and passwords of its clients whenever it connects to a remote server on behalf of those clients. **CREATE EXTERNLOGIN** assigns an alternate login name and password to be used when communicating with a remote server. It stores the password internally in encrypted form. The *remote_server* must be known to the local server by an entry in the `ISYSSERVER` system table. For more information, see the *CREATE SERVER Statement*.

Creating a remote login with the **CREATE EXTERNLOGIN** statement and defining a remote server with a **CREATE SERVER** statement sets up an external login and password for **INSERT...LOCATION** such that any user can use the login and password in any context. This avoids possible errors due to inaccessibility of the login or password, and is the recommended way to connect to a remote server.

Note: If you rely on the user ID and password of the current connection, and a user changes the password, you must stop and restart the server before the new password takes effect on the remote server. Remote logins created with **CREATE EXTERNLOGIN** are unaffected by changes to the password for the default user ID.

Sites with automatic password expiration should plan for periodic updates of passwords for external logins.

CREATE EXTERNLOGIN cannot be used from within a transaction.

- **login-name clause –** specifies the local user login name. When using integrated logins, the *login-name* is the database user to which the Windows user ID is mapped.
- **TO clause –** the **TO** clause specifies the name of the remote server.
- **REMOTE LOGIN clause –** the **REMOTE LOGIN** clause specifies the user account on *remote-server* for the local user *login-name*.
- **IDENTIFIED BY clause –** the **IDENTIFIED BY** clause specifies that *remote-password* is the password for *remote-user*. If you omit the **IDENTIFIED BY** clause, the password is sent to the remote server as NULL. If you specify **IDENTIFIED BY " "** (an empty string), the password sent is the empty string.

The *remote-user* and *remote-password* combination must be valid on *remote-server*.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *DROP EXTERNLOGIN Statement* on page 254
- *INSERT Statement* on page 320
- *CREATE SERVER Statement* on page 184

CREATE FUNCTION Statement

Creates a new function in the database.

Syntax

Syntax 1

```
CREATE [ OR REPLACE ] [ TEMPORARY ] FUNCTION [ owner.]function-name
( [ parameter, … ] )
 RETURNS data-type routine-characteristics
 [ SQL SECURITY { INVOKER | DEFINER } ]
 { compound-statement
```

```
  | AS tsql-compound-statement
  | external-name }
```

Syntax 2

```
CREATE FUNCTION [ owner.]function-name ( [ parameter, … ] )
 RETURNS data-type
 URL url-string
 [ HEADER header-string ]
 [ SOAPHEADER soap-header-string ]
 [ TYPE { 'HTTP[:{ GET | POST } ] ' | 'SOAP[:{ RPC | DOC } ]' } ]
 [ NAMESPACE namespace-string ]
 [ CERTIFICATE certificate-string ]
 [ CLIENTPORT clientport-string ]
 [ PROXY proxy-string ]
```

Parameters

- **url-string –** ' { **HTTP** | **HTTPS** | **HTTPS_FIPS** }://[*user:password@*]*hostname*[:*port*][/*path*] '
- **parameter – IN** *parameter-name data-type* [**DEFAULT** *expression*]
- **routine-characteristics – ON EXCEPTION RESUME** | [**NOT**] **DETERMINISTIC**
- **tsql-compound-statement –** *sql-statement sql-statement …*
- **external-name – EXTERNAL NAME** *library-call* | **EXTERNAL NAME** *java-call* **LANGUAGE JAVA**
- **library-call –** '[*operating-system*:]*function-name@library*; …'
- **operating-system – UNIX**
- **java-call –** '[*package-name*.]*class-name.method-name method-signature*'
- **method-signature –** ([*field-descriptor*, ….]) *return-descriptor*
- **field-descriptor and return-descriptor – Z** | **B** | **S** | **I** | **J** | **F** | **D** | **C** | **V** | **[** *descriptor* | **L** *class-name***;**

Examples

- **Example 1 –** Concatenate a `firstname` string and a `lastname` string:

```
CREATE FUNCTION fullname (
  firstname CHAR(30),
  lastname CHAR(30) )
RETURNS CHAR(61)
BEGIN
  DECLARE name CHAR(61);
  SET name = firstname || ' ' || lastname;
  RETURN (name);
END
```

This examples illustrate the use of the **fullname** function.

- Return a full name from two supplied strings:

```
SELECT fullname ('joe','smith')
```

fullname('joe', 'smith')
joe smith

- List the names of all employees:

```
SELECT fullname (givenname, surname)
FROM Employees
```

fullname (givenname, surname)
Fran Whitney
Matthew Cobb
Philip Chin
Julie Jordan
Robert Breault
...

- **Example 2 –** Use Transact-SQL syntax:

```
CREATE FUNCTION DoubleIt ( @Input INT )
RETURNS INT
AS
DECLARE @Result INT
SELECT @Result = @Input * 2
RETURN @Result
```

The statement `SELECT DoubleIt( 5 )` returns a value of `10`.

- **Example 3 –** Create an external function written in Java:

```
CREATE FUNCTION dba.encrypt( IN name char(254) )
RETURNS VARCHAR
EXTERNAL NAME
'Scramble.encrypt (Ljava/lang/String;)Ljava/lang/String;'
LANGUAGE JAVA
```

Usage

The **CREATE FUNCTION** statement creates a user-defined function in the database. A function can be created for another user by specifying an owner name. Subject to permissions, a user-defined function can be used in exactly the same way as other non-aggregate functions.

- **CREATE FUNCTION –** parameter names must conform to the rules for database identifiers. They must have a valid SQL data type and be prefixed by the keyword **IN**, signifying that the argument is an expression that provides a value to the function.

  Specifying **CREATE OR REPLACE FUNCTION** creates a new function, or replaces an existing function with the same name. When a function is replaced, the definition of the function is changed but the existing permissions are preserved.

You cannot use the **OR REPLACE** clause with temporary functions.

When functions are executed, not all parameters need to be specified. If a default value is provided in the **CREATE FUNCTION** statement, missing parameters are assigned the default values. If an argument is not provided by the caller and no default is set, an error is given.

Specifying **TEMPORARY** (**CREATE TEMPORARY FUNCTION**) means that the function is visible only by the connection that created it, and that it is automatically dropped when the connection is dropped. Temporary functions can also be explicitly dropped. You cannot perform **ALTER**, **GRANT**, or **REVOKE** operations on them, and unlike other functions, temporary functions are not recorded in the catalog or transaction log.

Temporary functions execute with the permissions of their creator (current user), and can only be owned by their creator. Therefore, do not specify owner when creating a temporary function.

Temporary functions can be created and dropped when connected to a read-only database.

- **SQL SECURITY –** defines whether the function is executed as the INVOKER, the user who is calling the function, or as the DEFINER, the user who owns the function. The default is DEFINER.

  When **SQL SECURITY INVOKER** is specified, more memory is used because annotation must be done for each user that calls the procedure. Also, when **SQL SECURITY INVOKER** is specified, name resolution is done as the invoker as well. Therefore, take care to qualify all object names (tables, procedures, and so on) with their appropriate owner.

- **compound-statement –** a set of SQL statements bracketed by **BEGIN** and **END**, and separated by semicolons. See *BEGIN … END Statement*.

- **tsql-compound-statement –** a batch of Transact-SQL statements.

- **EXTERNAL NAME –** a function using the **EXTERNAL NAME** clause is a wrapper around a call to a function in an external library. A function using **EXTERNAL NAME** can have no other clauses following the **RETURNS** clause. The library name may include the file extension, which is typically `.dll` on Windows and `.so` on UNIX. In the absence of the extension, the software appends the platform-specific default file extension for libraries.

  The **EXTERNAL NAME** clause is not supported for temporary functions.

- **EXTERNAL NAME LANGUAGE JAVA –** a function that uses **EXTERNAL NAME** with a **LANGUAGE JAVA** clause is a wrapper around a Java method. For information on calling Java procedures, see *CREATE PROCEDURE Statement*.

- **ON EXCEPTION RESUME –** uses Transact-SQL-like error handling. See *CREATE PROCEDURE Statement*.

- **NOT DETERMINISTIC –** a function specified as **NOT DETERMINISTIC** is re-evaluated each time it is called in a query. The results of functions not specified in this manner may be

cached for better performance, and re-used each time the function is called with the same parameters during query evaluation.

Functions that have side effects, such as modifying the underlying data, should be declared as **NOT DETERMINISTIC**. For example, a function that generates primary key values and is used in an **INSERT … SELECT** statement should be declared **NOT DETERMINISTIC**:

```
CREATE FUNCTION keygen( increment INTEGER )
RETURNS INTEGER
NOT DETERMINISTIC
BEGIN
  DECLARE keyval INTEGER;
  UPDATE counter SET x = x + increment;
  SELECT counter.x INTO keyval FROM counter;
  RETURN keyval
END
INSERT INTO new_table
SELECT keygen(1), ...
FROM old_table
```

Functions may be declared as **DETERMINISTIC** if they always return the same value for given input parameters.

All user-defined functions are treated as deterministic unless they are declared **NOT DETERMINISTIC**. Deterministic functions return a consistent result for the same parameters and are free of side effects. That is, the database server assumes that two successive calls to the same function with the same parameters will return the same result without unwanted side-effects on the semantics of the query.

To modify a user-defined function, or to hide the contents of a function by scrambling its definition, use the **ALTER FUNCTION** statement.

- **URL –** for use only when defining an **HTTP** or **SOAP** web services client function. Specifies the URL of the web service. The optional user name and password parameters provide a means of supplying the credentials needed for **HTTP** basic authentication. **HTTP** basic authentication base-64 encodes the user and password information and passes it in the "Authentication" header of the **HTTP** request.

  For web service client functions, the return type of **SOAP** and **HTTP** functions must one of the character data types, such as `VARCHAR`. The value returned is the body of the **HTTP** response. No **HTTP** header information is included. If more information is required, such as status information, use a procedure instead of a function.

  Parameter values are passed as part of the request. The syntax used depends on the type of request. For **HTTP**:**GET**, the parameters are passed as part of the URL; for **HTTP**:**POST** requests, the values are placed in the body of the request. Parameters to **SOAP** requests are always bundled in the request body.

- **HEADER –** when creating **HTTP** web service client functions, use this clause to add or modify **HTTP** request header entries. Only printable ASCII characters can be specified for

HTTP headers, and they are case-insensitive. For more information about how to use this clause, see the **HEADER** clause of the *CREATE PROCEDURE Statement*.

- **SOAPDHEADER –** when declaring a **SOAP** Web service as a function, use this clause to specify one or more **SOAP** request header entries. A **SOAP** header can be declared as a static constant, or can be dynamically set using the parameter substitution mechanism (declaring **IN**, **OUT**, or **INOUT** parameters for hd1, hd2, and so on). A web service function can define one or more **IN** mode substitution parameters, but cannot define an **INOUT** or **OUT** substitution parameter.
- **TYPE –** specifies the format used when making the web service request. If **SOAP** is specified or no type clause is included, the default type **SOAP**:**RPC** is used. **HTTP** implies **HTTP**:**POST**. Since **SOAP** requests are always sent as XML documents, **HTTP**:**POST** is always used to send **SOAP** requests.
- **NAMESPACE –** applies to **SOAP** client functions only and identifies the method namespace usually required for both **SOAP**:**RPC** and **SOAP**:**DOC** requests. The **SOAP** server handling the request uses this namespace to interpret the names of the entities in the **SOAP** request message body. The namespace can be obtained from the WSDL description of the **SOAP** service available from the web service server. The default value is the procedure's URL, up to but not including the optional path component.
- **CERTIFICATE –** to make a secure (HTTPS) request, a client must have access to the certificate used by the HTTPS server. The necessary information is specified in a string of semicolon-separated key/value pairs. The certificate can be placed in a file and the name of the file provided using the file key, or the whole certificate can be placed in a string, but not both. These keys are available:

Key	Abbreviation	Description
file		File name of certificate
certificate	cert	The certificate
company	co	Company specified in the certificate
unit		Company unit specified in the certificate
name		Common name specified in the certificate

  Certificates are required only for requests that are either directed to an HTTPS server or can be redirected from an insecure to a secure server.
- **CLIENTPORT –** identifies the port number on which the HTTP client procedure communicates using TCP/IP. It is provided for and recommended only for connections across firewalls, as firewalls filter according to the TCP/UDP port. You can specify a single port number, ranges of port numbers, or a combination of both; for example, CLIENTPORT '85,90-97'.

- **PROXY –** specifies the URI of a proxy server. For use when the client must access the network through a proxy. Indicates that the procedure is to connect to the proxy server and send the request to the web service through it.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

For function to be owned by self – Requires the CREATE PROCEDURE system privilege.

For function to be owned by any user – Requires one of:

- CREATE ANY PROCEDURE system privilege.
- CREATE ANY OBJECT system privilege.

To create a function containing an external reference, regardless of whether or not they are the owner of the function, also requires the CREATE EXTERNAL REFERENCE system privilege.

See also

- *ALTER FUNCTION Statement* on page 16
- *BEGIN … END Statement* on page 81
- *CREATE PROCEDURE Statement* on page 159
- *DROP Statement* on page 248
- *RETURN Statement* on page 387

CREATE FUNCTION Statement (Java UDF)

Creates a new external Java table UDF function in the database.

Syntax

```
CREATE [ OR REPLACE | TEMPORARY ] FUNCTION [ owner.]function-name
( [ parameter, … ] )
 RETURNS data-type routine-characteristics
 [ SQL SECURITY { INVOKER | DEFINER } ]
 { compound-statement
  | AS tsql-compound-statement
  | EXTERNAL NAME 'java-call' LANGUAGE JAVA }
```

Parameters

- **parameter – IN** *parameter-name data-type* [**DEFAULT** *expression*]
- **routine-characteristics – ON EXCEPTION RESUME** | [**NOT**] **DETERMINISTIC**
- **tsql-compound-statement –** *sql-statement sql-statement …*
- **environment-name – JAVA [ALLOW | DISALLOW SERVER SIDE REQUESTS]**
- **java-call –** '[*package-name.*]*class-name.method-name method-signature*'
- **method-signature –** ([*field-descriptor*, ….]) *return-descriptor*
- **field-descriptor and return-descriptor – Z** | **B** | **S** | **I** | **J** | **F** | **D** | **C** | **V** | **[** *descriptor* | **L** *class-name*;

Examples

- **Example 1 –** Create an external function written in Java:

```
CREATE FUNCTION dba.encrypt( IN name char(254) )
RETURNS VARCHAR
EXTERNAL NAME
'Scramble.encrypt (Ljava/lang/String;)Ljava/lang/String;'
LANGUAGE JAVA
```

Usage

LONG BINARY and LONG VARCHAR are not permitted as return-value data types.

EXTERNAL NAME LANGUAGE JAVA—A function that uses **EXTERNAL NAME** with a **LANGUAGE JAVA** clause is a wrapper around a Java method.

iq-environment-name: JAVA [ALLOW | *DISALLOW SERVER SIDE REQUESTS*]:

DISALLOW is the default.

ALLOW indicates that server-side connections are allowed.

Note: Do not specify **ALLOW** unless necessary. A setting of **ALLOW** slows down certain types of SAP Sybase IQ table joins.

Do not use UDFs with both **ALLOW SERVER SIDE REQUESTS** and **DISALLOW SERVER SIDE REQUESTS** in the same query.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

For function to be owned by self – Requires the CREATE PROCEDURE system privilege

For function to be owned by any user – Requires one of:

- CREATE ANY PROCEDURES system privilege.
- CREATE ANY OBJECT system privilege.

To create a function containing an external reference, regardless of whether or not they are the owner of the function, also requires the CREATE EXTERNAL REFERENCE system privilege.

CREATE INDEX Statement

Creates an index on a specified table, or pair of tables.

Syntax

```
CREATE [ UNIQUE ] [ index-type ] INDEX [ IF NOT EXISTS ] index-name
…ON [ owner.]table-name
… ( column-name [ , column-name ] …)
…[ { IN | ON } dbspace-name ]
…[ NOTIFY integer ]
…[ DELIMITED BY 'separators-string ' ]
…[ LIMIT maxwordsize-integer ]
```

Parameters

- **index-type –** { **CMP** | **HG** | **HNG** | **LF** | **WD** | **DATE** | **TIME** | **DTTM** }

Examples

- **Example 1 –** Create a Compare index on the `projected_earnings` and `current_earnings` columns. These columns are decimal columns with identical precision and scale.

  ```
  CREATE
  ```

  ```
  CMP INDEX proj_curr_cmp
  ON sales_data
  ( projected_earnings, current_earnings )
  ```

- **Example 2 –** Create a High_Group index on the `ID` column of the `SalesOrderItems` table. The data pages for this index are allocated from dbspace `Dsp5`.

  ```
  CREATE
  ```

  ```
  HG INDEX id_hg
  ON SalesOrderItems
  ( ID ) IN Dsp5
  ```

- **Example 3 –** Create a High_Group index on the `SalesOrderItems` table for the `ProductID` column:

```
CREATE HG INDEX item_prod_hg
ON Sales_OrderItems
( ProductID)
```

- **Example 4 –** Create a Low_Fast index on the `SalesOrderItems` table for the same `ProductID` column without any notification messages:

```
CREATE LF INDEX item_prod
ON SalesOrderItems
( ProductID)
 NOTIFY 0
```

- **Example 5 –** Create a **WD** index on the `earnings_report` table. Specify that the delimiters of strings are space, colon, semicolon, and period. Limit the length of the strings to 25.

```
CREATE WD INDEX earnings_wd
ON earnings_report_table(varchar)
DELIMITED BY ' :;.'
LIMIT 25
```

- **Example 6 –** Create a **DTTM** index on the `SalesOrders` table for the `OrderDate` column:

```
CREATE DTTM INDEX order_dttm
ON SalesOrders
( OrderDate )
```

Usage

The **CREATE INDEX** statement creates an index on the specified column of the named table. Once an index is created, it is never referenced in a SQL statement again except to delete it using the **DROP INDEX** statement.

For columns in SAP Sybase IQ tables, you can specify an *index-type* of **HG** (High_Group), **HNG** (High_Non_Group), **LF** (Low_Fast), **WD** (Word), **DATE**, **TIME**, or **DTTM** (Datetime). If you do not specify an *index-type*, an **HG** index is created by default.

To create an index on the relationship between two columns in an IQ main store table, you can specify an *index-type* of **CMP** (Compare). Columns must be of identical data type, precision and scale. For a `CHAR`, `VARCHAR`, `BINARY` or `VARBINARY` column, precision means that both columns have the same width.

For maximum query speed, the correct type of index for a column depends on:

- The number of unique values in the column
- How the column is going to be used in queries
- The amount of disk space available

You can specify multiple indexes on a column of an IQ main store table, but these must be of different index types. **CREATE INDEX** does not let you add a duplicate index type. SAP Sybase IQ chooses the fastest index available for the current query or portion of the query. However, each additional index type might significantly add to the space requirements of that table.

column-name—Specifies the name of the column to be indexed. A column name is an identifier preceded by an optional correlation name. (A correlation name is usually a table name. For more information on correlation names, see *FROM Clause*.) If a column name has characters other than letters, digits, and underscore, enclose it in quotation marks (“”).

When you omit **UNIQUE**, you can specify only an **HG** index. Foreign keys require nonunique **HG** indexes and composite foreign keys require nonunique composite **HG** indexes. The multicolumn composite key for both unique and nonunique **HG** indexes has a maximum width of 5300 bytes. `CHAR` or `VARCHAR` data cannot be more than 255 bytes when it is part of a composite key or single-column **HG**, **LF**, **HNG**, **DATE**, **TIME**, or **DTTM** indexes.

UNIQUE—**UNIQUE** ensures that no two rows in the table have identical values in all the columns in the index. Each index key must be unique or contain a NULL in at least one column. You can create unique **HG** indexes with more than one column, but you cannot create multicolumn indexes using other index types. You cannot specify **UNIQUE** with the **CMP**, **HNG**, **WD**, **DATE**, **TIME**, or **DTTM** index types.

SAP Sybase IQ allows the use of NULL in data values on a user created unique multicolumn HG index, if the column definition allows for NULL values and a constraint (primary key or unique) is not being enforced. See “Multicolumn indexes” in *Notes* for more information.

IF NOT EXISTS — if the named object already exists, no changes are made and an error is not returned.

IN—Specifies index placement. If you omit the IN clause, the index is created in the dbspace where the table is created. An index is always placed in the same type of dbspace (IQ store or temporary store) as its table. When you load the index, the data is spread across any database files of that type with room available. SAP Sybase IQ ensures that any *dbspace-name* you specify is appropriate for the index. If you try to specify `IQ_SYSTEM_MAIN` or other main dbspaces for indexes on temporary tables, or vice versa, you receive an error. Dbspace names are always case-insensitive, regardless of the **CREATE DATABASE**...**CASE IGNORE** or **CASE RESPECT** specification.

DELIMITED BY—Specifies separators to use in parsing a column string into the words to be stored in the **WD** index of that column. If you omit this clause or specify the value as an empty string, SAP Sybase IQ uses the default set of separators. The default set of separators is designed for the default collation order (ISO-BINENG). It includes all 7-bit ASCII characters that are not 7-bit ASCII alphanumeric characters, except for the hyphen and the single quotation mark. The hyphen and the single quotation mark are part of words by default. There are 64 separators in the default separator set. For example, if the column value is this string:

```
The cat is on the mat
```

and the database was created with the **CASE IGNORE** setting using default separators, these words are stored in the **WD** index from this string:

```
cat is mat on the
```

If you specify multiple **DELIMITED BY** and **LIMIT** clauses, no error is returned, but only the last clause of each type is used.

separators-string—The separators string must be a sequence of 0 or more characters in the collation order used when the database was created. Each character in the separators string is treated as a separator. If there are no characters in the separators string, the default set of separators is used. (Each separator must be a single character in the collation sequence being used.) There cannot be more than 256 characters (separators) in the separators string.

To specify tab as a delimiter, you can either type a <TAB> character within the separator string, or use the hexadecimal ASCII code of the tab character, \x09. "\t" specifies two separators, \ and the letter t. To specify newline as a delimiter, you can type a <RETURN> character or the hexadecimal ASCII code \x0a.

For example, the clause `DELIMITED BY ' :;.\/t'` specifies these seven separators:
`space : ; . \ / t`

Table 5. Tab and Newline as Delimiters

For these delimiters	Use this separators string in the DELIMITED BY clause
`tab`	`' '` (type <TAB>)or `'\x09'`
`newline`	`' '` (type <RETURN>) or `'\x0a'`

LIMIT—Can be used for the creation of the **WD** index only. Specifies the maximum word length that is permitted in the **WD** index. Longer words found during parsing causes an error. The default is 255 bytes. The minimum permitted value is 1 and the maximum permitted value is 255. If the maximum word length specified in the **CREATE INDEX** statement or determined by default exceeds the column width, the used maximum word length is silently reduced to the column width. Using a lower maximum permitted word length allows insertions, deletions, and updates to use less space and time. The empty word (two adjacent separators) is silently ignored. After a **WD** index is created, any insertions into its column are parsed using the separators and maximum word size determined at create time. These separators and maximum word size cannot be changed after the index is created.

NOTIFY—Gives notification messages after *n* records are successfully added for the index. The messages are sent to the standard output device. A message contains information about memory usage, database space, and how many buffers are in use. The default is 100,000 records. To turn off **NOTIFY**, set it to 0.

- Index ownership—There is no way to specify the index owner in the **CREATE INDEX** statement. Indexes are automatically owned by the owner of the table on which they are defined. The index name must be unique for each owner.
- No indexes on views—Indexes cannot be created for views.
- Index name—The name of each index must be unique for a given table.

- Exclusive table use—**CREATE INDEX** is prevented whenever the statement affects a table currently being modified by another connection. However, queries are allowed on a table that is also adding an index.
- CHAR columns—After a **WD** index is created, any insertions into its column are parsed using the separators, and maximum word size cannot be changed after the index is created. For `CHAR` columns, specify a space as at least one of the separators or use the default separator set. SAP Sybase IQ automatically pads `CHAR` columns to the maximum column width. If your column contains blanks in addition to the character data, queries on **WD** indexed data might return misleading results. For example, column `CompanyName` contains two words delimited by a separator, but the second word is blank padded:

  ```
  'Concord' 'Farms                                    '
  ```

  Suppose that a user entered this query:

  ```
  SELECT COUNT(*)FROM Customers WHERE CompanyName contains ('Farms')
  ```

  The parser determines that the string contains:

  ```
  'Farms           '
  ```

  instead of:

  ```
  'Farms'
  ```

  and returns 0 instead of 1. You can avoid this problem by using `VARCHAR` instead of `CHAR` columns.
- Data types:
  - You cannot use **CREATE INDEX** to create an index on a column with `BIT` data.
  - Only the default index, **CMP** index, or **WD** index can be created on `CHAR` and `VARCHAR` data with more than 255 bytes.
  - Only the default and **WD** index types can be created on `LONG VARCHAR` data.
  - Only the default index, **CMP** index, and **TEXT** index types can be created on `BINARY` and `VARBINARY` data with more than 255 bytes.
  - An **HNG** index or a **CMP** index cannot be created on a column with `FLOAT`, `REAL`, or `DOUBLE` data.
  - A **TIME** index can be created only on a column having the data type `TIME`.
  - A **DATE** index can be created only on a column having the data type `DATE`.
  - A **DTTM** index can be created only on a column having the data type `DATETIME` or `TIMESTAMP`.
- Multicolumn indexes—You can create a unique or nonunique **HG** index with more than one column. SAP Sybase IQ implicitly creates a nonunique **HG** index on a set of columns that makes up a foreign key.

  HG and **CMP** are the only types of indexes that can have multiple columns. You cannot create a unique **HNG** or **LF** index with more than one column, and you cannot create a **DATE**, **TIME**, or **DTTM** index with more than one column.

  The maximum width of a multicolumn concatenated key is 5KB (5300 bytes). The number of columns allowed depends on how many columns can fit into 5KB. `CHAR` or `VARCHAR`

data greater than 255 bytes are not allowed as part of a composite key in single-column **HG**, **LF**, **HNG**, **DATE**, **TIME**, or **DTTM** indexes.

An **INSERT** on a multicolumn index must include all columns of the index.

Queries with a single column in the **ORDER BY** clause run faster using multicolumn **HG** indexes. For example:

```
SELECT abs (x) from t1
ORDER BY x
```

In the above example, the **HG** index vertically projects *x* in sorted order.

To enhance query performance, use multicolumn **HG** indexes to run **ORDER BY** operations on more than one column (that can also include **ROWID**) in the **SELECT** or **ORDER BY** clause with these conditions:

- All projected columns, plus all ordering columns (except **ROWID**), exist within the index
- The ordering keys match the leading **HG** columns, in order

If more than one multicolumn **HG** index satisfies these conditions, the index with the lowest distinct counts is used.

If a query has an **ORDER BY** clause, and the **ORDER BY** column list is a prefix of a multicolumn index where all columns referenced in the **SELECT** list are present in a multicolumn index, then the multicolumn index performs vertical projection; for example:

```
SELECT x,z,y FROM T
ORDER BY x,y
```

If expressions exist on base columns in the **SELECT** list, and all the columns referenced in all the expressions are present in the multicolumn index, then the query will use a multicolumn index; for example:

```
SELECT power(x,2), x+y, sin(z) FROM T
ORDER BY x,y
```

In addition to the two previous examples, if the **ROWID()** function is in the **SELECT** list expressions, multicolumn indexes will be used. For example:

```
SELECT rowid()+x, z FROM T
ORDER BY x,y,z
```

In addition to the three previous examples, if **ROWID()** is present at the end of an **ORDER BY** list, and if the columns of that list—except for **ROWID()**—use multicolumn indexes in the exact order, multicolumn indexes will be used for the query. For example:

```
SELECT z,y FROM T
ORDER BY x,y,z,ROWID()
```

SAP Sybase IQ allows the use of NULL in data values on a user created unique multicolumn **HG** index, if the column definition allows for NULL values and a constraint (primary key or unique) is not being enforced. The rules for this feature are as follows:

- A NULL is treated as an undefined value.
- Multiple rows with NULL values in a unique index column or columns are allowed.

1. In a single column index, multiple rows with a NULL value in an index column are allowed.
2. In a multicolumn index, multiple rows with a NULL value in index column or columns are allowed, as long as non-NULL values in the rest of the columns guarantee uniqueness in that index.
3. In a multicolumn index, multiple rows with NULL values in all columns participating in the index are allowed.

These examples illustrate these rules. Given the table `table1`:

```
CREATE TABLE table1
(c1 INT NULL, c2 INT NULL, c3 INT NOT NULL);
```

Create a unique single column **HG** index on a column that allows NULLs:

```
CREATE UNIQUE HG INDEX c1_hg1 ON table1 (c1);
```

According to rule 1 above, you can insert a NULL value into an index column in multiple rows:

```
INSERT INTO table1(c1,c2,c3) VALUES (NULL,1,1);
INSERT INTO table1(c1,c2,c3) VALUES (NULL,2,2);
```

Create a unique multicolumn **HG** index on a columns that allows NULLs:

```
CREATE UNIQUE HG INDEX c1c2_hg2 ON table1(c1,c2);
```

According to rule 2 above, you must guarantee uniqueness in the index. The following **INSERT** does not succeed, since the multicolumn index `c1c2_hg2` on row 1 and row 3 has the same value:

```
INSERT INTO table1(c1,c2,c3) VALUES (NULL,1,3);
```

These **INSERT** operations are successful, however, according to rules 1 and 3:

```
INSERT INTO table1(c1,c2,c3) VALUES (NULL,NULL,3);
INSERT INTO table1(c1,c2,c3) VALUES (NULL,NULL,4);
```

Uniqueness is preserved in the multicolumn index.

This **UPDATE** operation is successful, as rule 3 allows multiple rows with NULL values in all columns in the multicolumn index:

```
UPDATE table1 SET c2=NULL WHERE c3=1
```

When a multicolumn **HG** index is governed by a unique constraint, a NULL value is not allowed in any column participating in the index.

- Parallel index creation—You can use the **BEGIN PARALLEL IQ … END PARALLEL IQ** statement to group **CREATE INDEX** statements on multiple IQ main store tables, so that they execute as though they are a single DDL statement. See *BEGIN PARALLEL IQ … END PARALLEL IQ Statement* for more information.

Warning! Using the **CREATE INDEX** command on a local temporary table containing uncommitted data fails and generates the error message `Local temporary table, <tablename>, must be committed in order to create an index.` Commit the data in the local temporary table before creating an index.

Side Effects

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Adaptive Server Enterprise has a more complex **CREATE INDEX** statement than SAP Sybase IQ. While the Adaptive Server Enterprise syntax is permitted in SAP Sybase IQ, some clauses and keywords are ignored. For the full syntax of the Adaptive Server Enterprise **CREATE INDEX** statement, see the *Adaptive Server Enterprise Reference Manual, Volume 2: Commands*.

Adaptive Server Enterprise indexes can be either *clustered* or *nonclustered*. A clustered index almost always retrieves data faster than a nonclustered index. Only one clustered index is permitted per table.

SAP Sybase IQ does not support clustered indexes. The CLUSTERED and NONCLUSTERED keywords are allowed by SQL Anywhere, but are ignored by SAP Sybase IQ. If no *index-type* is specified, SAP Sybase IQ creates an HG index on the specified column(s).

SAP Sybase IQ does not permit the DESC keyword.

Index names must be unique on a given table for both SAP Sybase IQ and Adaptive Server Enterprise.

Permissions

Requires CREATE privilege on the dbspace where the index is being created. Also requires one of::

- CREATE ANY INDEX system privilege.
- CREATE ANY OBJECT system privilege.
- REFERENCE privilege on the underlying table of the index.
- You own the underlying table of the index.

See also

- *BEGIN PARALLEL IQ … END PARALLEL IQ Statement* on page 83
- *DROP Statement* on page 248
- *INDEX_PREFERENCE Option* on page 545
- *FROM Clause* on page 288

CREATE LDAP SERVER Statement

Creates a new LDAP server configuration object for LDAP user authentication. Parameters defined during the creation of an LDAP server configuration object are stored in the ISYSLDAPSERVER (system view SYSLDAPSERVER) system table.

Syntax

```
CREATE LDAP SERVER ldapua-server-name
[ ldapua-server-attribs ]
[ WITH ACTIVATE ]

ldapua-server-attribs:
SEARCH DN
             URL { 'URL_string' | NULL }
             | ACCESS ACCOUNT { 'DN_string' | NULL }
             | IDENTIFIED BY ( 'password>' | NULL }
             | IDENTIFIED BY ENCRYPTED { encrypted-password | NULL }

| AUTHENTICATION URL { 'URL_string' | NULL }
| CONNECTION TIMEOUT timeout_value
| CONNECTION RETRIES retry_value
| TLS { ON | OFF }
```

Parameters

- **URL –** identifies the host (by name or by IP address), port number, and the search to be performed for the DN lookup for a given user ID. This value is validated for correct LDAP URL syntax before it is stored in the ISYSLDAPSERVER system table. The maximum size for this string is 1024 bytes.
- **ACCESS ACCOUNT –** s user created in the LDAP server for use by SAP Sybase IQ, not a user within SAP Sybase IQ. The distinguished name (DN) for this user is used to connect to the LDAP server. This user has permissions within the LDAP server to search for DNs by user ID in the locations specified by the SEARCH DN URL. The maximum size for this string is 1024 bytes.
- **IDENTIFIED BY –** provides the password associated with the ACCESS ACCOUNT user. The password is stored using symmetric encryption on disk. Use the value NULL to clear the password and set it to none. The maximum size of a clear text password is 255 bytes.
- **IDENTIFIED BY ENCRYPTED –** configures the password associated with the ACCESS ACCOUNT distinguished name in an encrypted format. The binary value is the encrypted password and is stored on disk as is. Use the value NULL to clear the password and set it to none. The maximum size of the binary is 289 bytes. The encrypted key should be a valid varbinary value. Do not enclose the encrypted key in quotation marks.
- **AUTHENTICATION URL –** identifies the host (by name or IP address) and the port number of the LDAP server to use for authentication of the user. This is the value defined

for <URL_string> and is validated for correct LDAP URL syntax before it is stored in `ISYSLDAPSERVER` system table. The DN of the user obtained from a prior DN search and the user password bind a new connection to the authentication URL. A successful connection to the LDAP server is considered proof of the identity of the connecting user. The maximum size for this string is 1024 bytes.

- **CONNECTION TIMEOUT –** specifies the connection timeout from SAP Sybase IQ to the LDAP server for both DN searches and authentication. This value is in milliseconds, with a default value of 10 seconds.
- **CONNECTION RETRIES –** specifies the number of retries on connections from SAP Sybase IQ to the LDAP server for both DN searches and authentication. The valid range of values is 1– 60, with a default value of 3.
- **TLS –** defines whether the TLS or Secure LDAP protocol is used for connections to the LDAP server for both DN searches and authentication. When set to ON, the TLS protocol is used and the URL would being with "ldap://" When set to OFF (or not specified), Secure LDAP protocol is used and the URL begins with “ldaps://”. When using the TLS protocol, specify the database security option TRUSTED_CERTIFICATES_FILE with a file name containing the certificate of the Certificate Authority (CA) that signed the certificate used by the LDAP server.
- **WITH ACTIVATE –** activates the LDAP server configuration object for immediate use upon creation. This permits the definition and activation of LDAP User Authentication in one statement. The LDAP server configuration object state changes to READY when WITH ACTIVATE is used.

Examples

- **Example 1 –** sets the search parameters, the authentication URL, and sets a three second timeout, and activates the server so it can begin authenticating users. It connects to the LDAP server without TLS or SECURE LDAP protocols.

```
SET OPTION PUBLIC.login_mode = ‘Standard,LDAPUA’
CREATE LDAP SERVER apps_primary
SEARCH DN
    URL 'ldap://my_LDAPserver:389/dc=MyCompany,dc=com??sub?cn=*'
    ACCESS ACCOUNT 'cn=aseadmin, cn=Users, dc=mycompany, dc=com'
    IDENTIFIED BY 'Secret99Password'
AUTHENTICATION URL 'ldap://my_LDAPserver:389/'
CONNECTION TIMEOUT 3000
WITH ACTIVATE
```

- **Example 2 –** uses the same search parameters as example 1, but specifies “ldaps” so that a Secure LDAP connection is established with the LDAP server on host my_LDAPserver, port 636. Only LDAP clients using the Secure LDAP protocol may now connect on this port. The database security option TRUSTED_CERTIFICATE_FILE must be set with a file name containing the certificate of the certificate authority (CA) that signed the certificate used by the LDAP server at "ldaps://my_LDAPserver:636". During the handshake with the LDAP server, the certificate presented by the LDAP server is checked by the SAP Sybase IQ server (the LDAP client) to ensure that it is signed by one of the

certificates listed in the file. This establishes trust by the client that the server is who it says it is. The ACCESS ACCOUNT and IDENTIFIED BY parameters establish trust by the LDAP server that the client is who it says it is.

Note: The TLS parameter must be OFF when Secure LDAP is used instead of TLS protocol.

```
SET OPTION PUBLIC.login_mode = 'Standard,LDAPUA'
SET OPTION PUBLIC.trusted_certificates_file = '/mycompany/shared/
trusted.txt'
CREATE LDAP SERVER secure_primary
SEARCH DN
    URL  'ldaps://my_LDPAserver:636/dc=MyCompany,dc=com??sub?
cn=*'
    ACCESS ACCOUNT 'cn=aseadmin, cn=Users, dc=mycompany, dc=com'
    IDENTIFIED BY 'Secret99Password'
AUTHENTICATION URL 'ldaps://my_LDAPserver:636/'
CONNECTION TIMEOUT 3000
TLS OFF
WITH ACTIVATE
```

- **Example 3 –** establishes the TLS protocol on port 389. It also requires database security option TRUSTED_CERTIFICATE_FILE to be set with a file name and provides the same type of security as example 2. In this example, the TLS protocol is ON to facilitate wider support by LDAP server vendors.

Note: Check the requirements of all your LDAP servers when deciding how to configure Secure LDAP or TLS for an SAP Sybase IQ server.

```
SET OPTION PUBLIC.login_mode = 'Standard,LDAPUA'
SET OPTION PUBLIC.trusted_certificates_file = '/mycompany/shared/
trusted.txt'
CREATE LDAP SERVER tls_primary
SEARCH DN
   URL  'ldap://my_LDAPserver:389/dc=MyCompany,dc=com??sub?cn=*'
    ACCESS ACCOUNT 'cn=aseadmin, cn=Users, dc=mycompany, dc=com'
    IDENTIFIED BY 'Secret99Password'
AUTHENTICATION URL 'ldap://my_LDAPserver:389/'
CONNECTION TIMEOUT 3000
TLS ON
WITH ACTIVATE
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY LDAP SERVER system privilege.

CREATE LOGICAL SERVER Statement

Creates a user-defined logical server.

Syntax

```
CREATE LOGICAL SERVER logical-server-name [
     { ls-create-clause, ...} ] [ WITH STOP SERVER ]
```

Parameters

- **ls-create-clause –** { **MEMBERSHIP** ({ *ls-member*, ...}) | **POLICY** *ls-policy-name* }
- **ls-member – FOR LOGICAL COORDINATOR** | *mpx-server-name*

Applies to

Multiplex only.

Examples

- **Example 1 –** creates a user-defined logical server *ls1* with three multiplex nodes as its members.

```
CREATE LOGICAL SERVER ls1 MEMBERSHIP ( n1, n2, n3 )
```

- **Example 2 –** creates a user-defined logical server *ls1* with three member nodes, and defines the logical server policy name *lsp1*.

```
CREATE LOGICAL SERVER ls1 MEMBERSHIP ( w1_svr, w2_svr, r2_svr )
POLICY lsp1
```

- **Example 3 –** creates servers as in Example 2, except that **WITH STOP SERVER** automatically shuts down all servers in the logical server when the TEMP_DATA_IN_SHARED_TEMP option is changed directly or indirectly.

```
CREATE LOGICAL SERVER ls1 MEMBERSHIP ( w1_svr, w2_svr, r2_svr )
POLICY lsp1 WITH STOP SERVER
```

- **Example 4 –** creates a user-defined logical server *ls1* with logical server policy *lspolicy1* and no member nodes.

```
CREATE LOGICAL SERVER ls1 POLICY lspolicy1
```

- **Example 5 –** where *n1* is the current coordinator, creates a logical server *ls2* with the named membership of multiplex nodes *n1* and *n3* and logical membership of the coordinator. Also sets the logical server policy of *ls2* to *lspolicy2*.

```
CREATE LOGICAL SERVER ls2 POLICY
MEMBERSHIP FOR LOGICAL COORDINATOR
lspolicy1, n1, n2, n3 POLICY lspolicy2
```

Usage

The catalog stores the logical server and its membership definitions. To define a logical membership to the coordinator, specify **FOR LOGICAL COORDINATOR** in the **MEMBERSHIP** clause. To define a logical server policy name, specify **POLICY**.

When no members are specified during the creation of a logical server, the logical server is created empty.

Note: Implicit logical server membership definitions, such as those for OPEN and SERVER logical servers, are not stored at all.

The `SYS.ISYSIQLOGICALSERVER` system table stores information about the logical server policy for a corresponding logical server.

The `SYS.ISYSLOGICALMEMBER` system table stores definitions for the logical server memberships.

ls-policy-name can be any user-specified identifier except ROOT.

The **POLICY** clause associates a logical server with a user-defined logical server policy. If no **POLICY** clause is specified, the logical server is associated with the root policy.

logical-server-name can be any user-specified identifier except:

- ALL
- AUTO
- COORDINATOR
- DEFAULT
- NONE
- OPEN
- SERVER

Changing the `ALLOW_COORDINATOR_AS_MEMBER` option of the root logical server policy from ON to OFF does not affect the membership information stored in the catalog. Instead, it affects only the effective configuration of the logical server.

You can define a logical server membership to the current coordinator either by specifying the multiplex server name or by using the **FOR LOGICAL COORDINATOR** clause, even when `ALLOW_COORDINATOR_AS_MEMBER` is set to OFF. Membership definition is stored in the catalog, but is inactive while that multiplex server acts as the coordinator.

WITH STOP SERVER automatically shuts down all servers in the logical server when the `TEMP_DATA_IN_SHARED_TEMP` option is changed directly or indirectly.

This statement enforces consistent shared system temporary store settings across physical nodes shared by logical servers.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

CREATE LOGIN POLICY Statement

Creates a login policy in the database.

Syntax

```
CREATE LOGIN POLICY policy-name
AUTO_UNLOCK_TIME=0 - UNLIMITED
| DEFAULT_LOGICAL_SERVER=[logical_server_name | ALL | AUTO | COORDINATOR |
NONE | OPEN | SERVER]
| CHANGE_PASSWORD_DUAL_CONTROL=[ON | OFF]
| LOCKED=[ON | OFF]
| MAX_CONNECTIONS=0 - 2147483647
| MAX_DAYS_SINCE_LOGIN=0 - 2147483647
| MAX_FAILED_LOGIN_ATTEMPTS=0 - 2147483647
| MAX_NON_DBA_CONNECTIONS=0 - 2147483647
| PASSWORD_EXPIRY_ON_NEXT_LOGIN=[ON | OFF]
| PASSWORD_GRACE_TIME=0 - 2147483647
| PASSWORD_LIFE_TIME=0 - 2147483647
| ROOT_AUTO_UNLOCK_TIME=0 - UNLIMITED
| LDAP_PRIMARY_SERVER=server_name
| LDAP_SECONDARY_SERVER=server_name
| LDAP_AUTO_FAILBACK_PERIOD=0 - 2147483647
| LDAP_FAILOVER_TO_STD=[ON | OFF]
| LDAP_REFRESH_DN=NOW
```

Applies to

Simplex and multiplex.

Examples

- **Example 1 –** creates the `Test1` login policy. This login policy has an unlimited password life and allows the user a maximum of five attempts to enter a correct password before the account is locked.

```
CREATE LOGIN POLICY Test1
password_life_time=UNLIMITED
max_failed_login_attempts=5;
```

Usage

If you do not specify a login policy option, the value from the root login policy is applied.

Permissions

Requires MANAGE ANY LOGIN POLICY system privilege.

The following system privileges can override the noted login policy options:

Exception System Privilege	Login Policy Option
SERVER OPERATOR or DROP CONNECTION system privilege	MAX_NON_DBA_CONNS MAX_CONNECTIONS
MANAGE ANY USER system privilege	LOCKED MAX_DAYS_SINCE_LOGIN

Login Policy Options

Available options for root and user-defined login policies.

Option	Description
AUTO_UNLOCK_TIME	The time period after which locked accounts not granted the MANAGE ANY USER system privilege are automatically unlocked. This option can be defined in any login policy, including the root login policy. • **Values –** 0 – unlimited • **Initial value for Root policy –** Unlimited • **Applies to –** All users not granted the MANAGE ANY USER system privilege.
CHANGE_PASSWORD_DUAL_CONTROL	Requires input from two users, each granted the CHANGE PASSWORD system privilege, to change the password of another user. • **Values –** ON, OFF • **Initial value for Root policy –** OFF • **Applies to –** All users.

Option	Description

DEFAULT_LOGICAL_SERVER	If the connection string specifies no logical server, the user connects to the `DEFAULT_LOGICAL_SERVER` setting specified in the user's login policy.
	• **Values –**
	  • Name of an existing user-defined logical server
	  • ALL – allows access to all logical servers.
	  • AUTO – value of the default logical server in the root login policy.
	  • COORDINATOR – the current coordinator node.
	  • NONE – denies access to any multiplex server.
	  • OPEN – use alone or with the name of a user-defined logical server. Allows access to all multiplex nodes that are not members of any user-defined logical servers.
	  • SERVER – allows access to all of the multiplex nodes, subject to the semantics of the SERVER logical server.
	• **Initial value for Root policy –** AUTO
	• **Applies to –** All users. Requires MANAGE MULTIPLEX system privilege.

LOCKED	If set ON, users cannot establish new connections. This setting temporarily denies access to login policy users. Logical server overrides for this option are not allowed. • **Values –** ON, OFF • **Initial value for Root policy –** OFF • **Applies to –** All users except those with the MANAGE ANY USER system privilege.
MAX_CONNECTIONS	The maximum number of concurrent connections allowed for a user. You can specify a per-logical-server setting for this option. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users except those with the SERVER OPERATOR or DROP CONNECTION system privilege.

Option	Description
MAX_DAYS_SINCE_LOGIN	The maximum number of days that can elapse between two successive logins by the same user. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users except those with the MANAGE ANY USER system privilege.
MAX_FAILED_LOGIN_ATTEMPTS	The maximum number of failed attempts, since the last successful attempt, to log into the user account before the account is locked. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users.
MAX_NON_DBA_CONNECTIONS	The maximum number of concurrent connections that a user without SERVER OPERATOR or DROP CONNECTION system privileges can make. This option is supported only in the root login policy. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users except those with the SERVER OPERATOR or DROP CONNECTION privilege.
PASSWORD_EXPIRY_ON_NEXT_LOGIN	If set ON, the user's password expires at the next login. • **Values –** ON, OFF • **Initial value for Root policy –** OFF • **Applies to –** All users. **Note:** This functionality is not currently implemented when logging in to Sybase Control Center. A user will not be prompted to change their password. He or she will be prompted, however, when logging in to SAP Sybase IQ outside of Sybase Control Center (for example, using Interactive SQL).
PASSWORD_GRACE_TIME	The number of days before password expiration during which login is allowed but the default post_login procedure issues warnings. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** 0 • **Applies to –** All users.

Option	Description
PASS-WORD_LIFE_TIME	The maximum number of days before a password must be changed. • **Values –** 0 – 2147483647 • **Initial value for Root policy –** Unlimited • **Applies to –** All users.
ROOT_AUTO_UN-LOCK_TIME	The time period after which locked accounts granted the MANAGE ANY USER system privilege are automatically unlocked. This option can be defined only in the root login policy. • **Values –** 0 – unlimited • **Initial value for Root policy –** 15 • **Applies to –** All users granted the MANAGE ANY USER system privilege.

LDAP Login Policy Options

Available login policy options for LDAP user authentication

Option	Description
LDAP_PRI-MARY_SERV-ER	Specifies the name of the primary LDAP server. • **Values –** n/a • **Initial value for Root policy –** None • **Applies to –** All users.
LDAP_SECON-DARY_SERV-ER	Specifies the name of the secondary LDAP server. • **Values –** n/a • **Initial value for ROOT policy –** None • **Applies to –** All users.
LDAP_AU-TO_FAIL-BACK_PERIOD	Specifies the time period, in minutes, after which automatic failback to the primary server is attempted. • **Values –** 0 - 2147483647 • **Initial value for ROOT policy –** 15 minutes • **Applies to –** All users.

Option	Description
LDAP_FAIL-OVER_TO_STD	Permits authentication with standard authentication when authentication with the LDAP server fails due to system resources, network outage, connection timeouts, or similar system failures. However, it does not permit an actual authentication failure returned from an LDAP server to fail over to standard authentication. • **Values –** ON, OFF • **Initial value for ROOT policy –** ON • **Applies to –** All users.
LDAP_RE-FRESH_DN	Updates the `ldap_refresh_dn` value in the `ISYSLOGINPOLICYOP-TION` system table with the current time, stored in Coordinated Universal Time (UTC). Each time a user authenticates with LDAP, if the value of the option `ldap_re-fresh_dn` in `ISYSLOGINPOLICYOPTION` is more recent than the `user_dn` value in `ISYSUSER`, a search for a new user DN occurs. The `user_dn` value is then updated with the new user DN and the `user_dn_changed_at` value is again updated to the current time. • **Values –** NOW • **Initial value for ROOT policy –** NULL • **Initial value for user-defined login policy –** Current time stored in UTC • **Applies to –** All users.

Multiplex Login Policy Configuration

Configure login policies for multiplex servers.

Example

This example overrides the login policy settings on a logical server, increasing the maximum number of connections on logical server `ls1`:

```
ALTER LOGIN POLICY lp1 max_connections=20 LOGICAL SERVER ls1;
```

Usage

Applies only to multiplex.

Any login management commands you execute on any multiplex server automatically propagate to all servers in the multiplex. For best performance, execute these commands, or any DDL, on the coordinator.

An override at the logical server level override means that a particular login policy option has different settings for different logical servers. `SYS.ISYSIQLSLOGINPOLICYOPTION` stores login policy option values for logical-server override. For each logical-server override

of a login policy option, a corresponding row exists in ISYSIQLSLOGINPOLICYOPTION.

CREATE LS POLICY Statement

Creates a user-defined logical server policy.

Syntax

```
CREATE LS POLICY policy-name option-value-list [ WITH STOP SERVER ]
```

Parameters

- **option-value-list –**

```
{ option-name = value } ...
```

- **option-name –**

```
 ALLOW_COORDINATOR_AS_MEMBER = < ON | OFF>
| DQP_ENABLED = < 0 | 1 | 2>
| LOGIN_REDIRECTION = < ON | OFF>
| REDIRECTION_WAITERS_THRESHOLD = < num >
| TEMP_DATA_IN_SHARED_TEMP = < ON | OFF >
```

Applies to

Multiplex only.

Examples

- **Example 1 –** creates a user-defined logical server policy named *lspolicy1*:

```
CREATE LS POLICY lspolicy1
ALLOW_COORDINATOR_AS_MEMBER=ON;
```

Usage

You can specify any identifier except ROOT for the policy name.

The option values listed are modified for the new policy. Any unspecified option inherits its value from the root logical server policy.

If you want a smaller IQ_SYSTEM_TEMP dbspace, turn ON the option TEMP_DATA_IN_SHARED_TEMP to write temporary data to IQ_SHARED_TEMP instead of IQ_SYSTEM_TEMP. In a distributed query processing environment, however, setting both DQP_ENABLED and TEMP_DATA_IN_SHARED_TEMP ON could saturate your SAN with additional data in IQ_SHARED_TEMP, where additional I/O operations against IQ_SHARED_TEMP may adversely affect DQP performance.

WITH STOP SERVER automatically shuts down all servers in the logical server when the `TEMP_DATA_IN_SHARED_TEMP` option is changed directly or indirectly.

This statement enforces consistent shared system temporary store settings across physical nodes shared by logical servers.

Table 6. Logical Server Policy Options

Logical Server Policy Option	Allowed Values	Behavior
ALLOW_COORDINATOR_AS_MEMBER	ON, OFF	Can only be set for the ROOT logical server policy. When ON (the default), the coordinator can be a member of any user-defined logical server. OFF prevents the coordinator from being used as a member of any user-defined logical servers.
DQP_ENABLED	0, 1, 2	When set to 0, query processing is not distributed. When set to 1 (the default), query processing is distributed as long as a writable shared temporary file exists. When set to 2, query processing is distributed over the network, and the shared temporary store is not used.
LOGIN_REDIRECTION	ON, OFF	When ON, enables login redirection for logical servers governed by specified login policy. When OFF (the default), disables login redirection at the logical server level, allowing external connection management.
REDIRECTION_WAITERS_THRESHOLD	Integer	Specifies how many connections can queue before SAP Sybase IQ redirects a connection to this logical server to another server. Can be any integer value; default is 5.
TEMP_DATA_IN_SHARED_TEMP	ON, OFF	When ON, all temporary table data and eligible scratch data writes to the shared temporary store, provided that the shared temporary store has at least one read-write file added. You must restart all multiplex nodes after setting this option or after adding a read-write file to the shared temporary store. (If the shared temporary store contains no read-write file, or if you do not restart nodes, data is written to IQ_SYSTEM_TEMP instead.) When OFF (the default), all temporary table data and scratch data writes to the local temporary store.

Standards

- SQL – vendor extension to ISO/ANSI SQL grammar.
- Sybase – not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

CREATE MESSAGE Statement [T-SQL]

Adds a user-defined message to the `SYSUSERMESSAGES` system table for use by **PRINT** and **RAISERROR** statements.

Syntax

```
CREATE MESSAGE message-number
... AS 'message-text'
```

Usage

CREATE MESSAGE associates a message number with a message string. The message number can be used in **PRINT** and **RAISERROR** statements.

- message_number—The message number of the message to add. The message number for a user-defined message must be 20000 or greater.
- message_text—The text of the message to add. The maximum length is 255 bytes. **PRINT** and **RAISERROR** recognize placeholders in the message text to print out. A single message can contain up to 20 unique placeholders in any order. These placeholders are replaced with the formatted contents of any arguments that follow the message when the text of the message is sent to the client.

  Placeholders are numbered to allow reordering of the arguments when translating a message to a language with a different grammatical structure. A placeholder for an argument appears as "%nn!"—a percent sign (%), followed by an integer from 1 to 20, followed by an exclamation mark (!)—where the integer represents the position of the argument in the argument list, "%1!" is the first argument, "%2!" is the second argument, and so on.

There is no parameter corresponding to the *language* argument for **sp_addmessage**.

Side Effects

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—The functionality of **CREATE MESSAGE** is provided by the **sp_addmessage** procedure in Adaptive Server Enterprise.

Permissions

Requires one of:

- CREATE MESSAGE system privilege.
- CREATE ANY OBJECT system privilege.

See also

- *PRINT Statement [T-SQL]* on page 369
- *RAISERROR Statement [T-SQL]* on page 372

CREATE MULTIPLEX SERVER Statement

Creates a multiplex server.

Syntax

Variable declaration:

```
CREATE MULTIPLEX SERVER server-name DATABASE
'dbfile' host-port list [ ROLE {  READER |  WRITER  } ]
[  STATUS | { INCLUDED |  EXCLUDED } ]
```

Parameters

- **host-port-list –** {[**PRIVATE**] **HOST** ' *hostname* ' **PORT** *port number* }

Applies to

Multiplex only.

Usage

If you plan to use UNIX soft (symbolic) links for server paths, create the soft link before you run **CREATE MULTIPLEX SERVER**. When you start the new server, the database file path must match the database file path specified when creating that server.

Choose the name of the multiplex server (*server-name*) according to the rules for server startup option **-n**.

When creating the initial multiplex server, both coordinator node and secondary node rows are added to `SYS.ISYSIQMPXSERVER`. The transaction log records this operation as two

separate **CREATE MULTIPLEX SERVER** commands, one for the coordinator node and one for the secondary node.

After creating the first secondary node, the coordinator shuts down automatically.

The `SYS.ISYSIQMPXSERVER` system table stores the HOST hostname PORT portname pairs in its connection_info string as host:port[;host:port…].

Note: Use multiple host:port pairs if the computer the multiplex server is running on has multiple redundant network cards mapped to different network addresses.

You may specify the clauses DATABASE, host-port list, ROLE and STATUS in any order. The default ROLE is READER. The default STATUS is INCLUDED.

The host-port-list keyword PRIVATE specifies that the particular HOST PORT pair is for private interconnection. A separate private interconnection for multiplex interprocess communication (MIPC) enables highly available and high-performance network configurations. SAP Sybase IQ automatically opens private ports; you need not list them in the host-port-list used to start the server. All public and private ports require unique port numbers to avoid conflicts.

When you add a server, the coordinator must be running, but you can run the **CREATE MULTIPLEX SERVER** command from any server in the multiplex.

This statement is automatically committed.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

CREATE PROCEDURE Statement

Creates a new user-defined SQL procedure in the database.

To create external procedure interfaces, see *CREATE PROCEDURE Statement (External Procedures)*.

Syntax

```
CREATE [ OR REPLACE | TEMPORARY ] PROCEDURE [ owner.]procedure-name
( [ parameter, …] ) {
[ RESULT ( result-column, …) | NO RESULT SET ]
[ SQL SECURITY { INVOKER | DEFINER } ]
[ ON EXCEPTION RESUME ] compound statement | AT location-string
```

Parameters

- **parameter –** *parameter_mode parameter-name data-type* [**DEFAULT** *expression*] | **SQLCODE** | **SQLSTATE**

- **parameter_mode – IN** | **OUT** | **INOUT**
- **result-column –** *column-name data-type*

Examples

- **Example 1 –** Use a case statement to classify the results of a query:

```
CREATE PROCEDURE ProductType (IN product_id INT, OUT type
CHAR(10))
BEGIN
  DECLARE prod_name CHAR(20) ;
  SELECT name INTO prod_name FROM "GROUPO"."Products"
  WHERE ID = product_id;
  CASE prod_name
  WHEN 'Tee Shirt' THEN
    SET type = 'Shirt'
  WHEN 'Sweatshirt' THEN
    SET type = 'Shirt'
  WHEN 'Baseball Cap' THEN
    SET type = 'Hat'
  WHEN 'Visor' THEN
    SET type = 'Hat'
  WHEN 'Shorts' THEN
    SET type = 'Shorts'
  ELSE
    SET type = 'UNKNOWN'
  END CASE ;
END
```

- **Example 2 –** Use a cursor and loop over the rows of the cursor to return a single value:

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35), OUT
TopValue INT)
BEGIN
  DECLARE err_notfound EXCEPTION
     FOR SQLSTATE '02000' ;
  DECLARE curThisCust CURSOR FOR
  SELECT CompanyName, CAST(       sum(SalesOrderItems.Quantity *
  Products.UnitPrice) AS INTEGER) VALUE
  FROM Customers
  LEFT OUTER JOIN SalesOrders
  LEFT OUTER JOIN SalesorderItems
  LEFT OUTER JOIN Products
  GROUP BY CompanyName ;


  DECLARE ThisValue INT ;
  DECLARE ThisCompany CHAR(35) ;
  SET TopValue = 0 ;
  OPEN curThisCust ;
  CustomerLoop:
  LOOP
    FETCH NEXT curThisCust
    INTO ThisCompany, ThisValue ;
    IF SQLSTATE = err_notfound THEN
      LEAVE CustomerLoop ;
```

```
    END IF ;
    IF ThisValue > TopValue THEN
      SET TopValue = ThisValue ;
      SET TopCompany = ThisCompany ;
      END IF ;
  END LOOP CustomerLoop ;
  CLOSE curThisCust ;
END
```

Usage

CREATE PROCEDURE creates a procedure in the database. Users with the CREATE ANY OBJECT system privilege can create procedures for other users by specifying an **owner**. A procedure is invoked with a **CALL** statement.

Note: There are two ways to create stored procedures: ISO/ANSI SQL and T-SQL. **BEGIN TRANSACTION**, for example, is T-SQL-specific when using **CREATE PROCEDURE** syntax. Do not mix syntax when creating stored procedures. See *CREATE PROCEDURE Statement [T-SQL]*.

CREATE PROCEDURE— You can create permanent or temporary (TEMPORARY) stored procedures. You can use PROC as a synonym for PROCEDURE.

Parameter names must conform to the rules for other database identifiers, such as column names, and must be a valid SQL data type. The keywords have the following meanings:

Parameters can be prefixed by one of the keywords IN, OUT or INOUT. If no keyword is specified, parameters are INOUT by default. The keywords have the following meanings:

- IN—The parameter is an expression that provides a value to the procedure.
- OUT—The parameter is a variable that could be given a value by the procedure.
- INOUT—The parameter is a variable that provides a value to the procedure, and could be given a new value by the procedure.

When procedures are executed using **CALL**, not all parameters need to be specified. If a default value is provided in the **CREATE PROCEDURE** statement, missing parameters are assigned the default values. If an argument is not provided in the **CALL** statement, and no default is set, an error is given.

SQLSTATE and **SQLCODE** are special parameters that output the **SQLSTATE** or **SQLCODE** value when the procedure ends (they are **OUT** parameters). Whether or not a **SQLSTATE** and **SQLCODE** parameter is specified, the **SQLSTATE** and **SQLCODE** special values can always be checked immediately after a procedure call to test the return status of the procedure.

The **SQLSTATE** and **SQLCODE** special values are modified by the next SQL statement. Providing **SQLSTATE** or **SQLCODE** as procedure arguments allows the return code to be stored in a variable.

Specifying **CREATE OR REPLACE PROCEDURE** creates a new procedure, or replaces an existing procedure with the same name. This clause changes the definition of the procedure,

but preserves existing permissions. You cannot use the **OR REPLACE** clause with temporary procedures. Also, an error is returned if the procedure being replaced is already in use.

Specifying **CREATE TEMPORARY PROCEDURE** means that the stored procedure is visible only by the connection that created it, and that it is automatically dropped when the connection is dropped. You can also explicitly drop temporary stored procedures. You cannot perform **ALTER**, **GRANT**, or **REVOKE** on them, and, unlike other stored procedures, temporary stored procedures are not recorded in the catalog or transaction log.

Temporary procedures execute with the permissions of their creator (current user), or specified owner. You can specify an owner for a temporary procedure when:

- The temporary procedure is created within a permanent stored procedure
- The temporary and permanent procedure both have the same owner

To drop the owner of a temporary procedure, drop the temporary procedure first.

You can create and drop temporary stored procedures when you are connected to a read-only database; they cannot be external procedures.

For example, the following temporary procedure drops the table called `CustRank`, if it exists. For this example, the procedure assumes that the table name is unique and can be referenced by the procedure creator without specifying the table owner:

```
CREATE TEMPORARY PROCEDURE drop_table( IN @TableName char(128) )
BEGIN
    IF EXISTS  ( SELECT 1 FROM SYS.SYSTAB WHERE
    table_name = @TableName )
    THEN EXECUTE IMMEDIATE
    'DROP TABLE "' || @TableName || '"';
    MESSAGE 'Table "' || @TableName ||
    '" dropped' to client;
    END IF;
END;
CALL drop_table( 'CustRank' )
```

RESULT—Declares the number and type of columns in the result set. The parenthesized list following the **RESULT** keyword defines the result column names and types. This information is returned by the Embedded SQL **DESCRIBE** or by ODBC **SQLDescribeCol** when a **CALL** statement is being described. Allowed data types are listed in *Reference: Building Blocks, Tables, and Procedures > SQL Data Types*.

Some procedures can produce more than one result set, depending on how they are executed. For example, this procedure returns two columns under some circumstances, and one in others.

```
CREATE PROCEDURE names( IN formal char(1))
BEGIN
  IF formal = 'n' THEN
    SELECT GivenName
    FROM Employees
  ELSE
    SELECT Surname,GivenName
```

```
    FROM Employees
  END IF
END
```

Procedures with variable result sets must be written without a **RESULT** clause, or in Transact-SQL. Their use is subject to these limitations:

- Embedded SQL—You must **DESCRIBE** the procedure call after the cursor for the result set is opened, but before any rows are returned, in order to get the proper shape of result set. The **CURSOR** *cursor-name* clause on the **DESCRIBE** statement is required.
- ODBC, OLE DB, ADO.NET—Variable result-set procedures can be used by ODBC applications. The proper description of the result sets is carried out by the driver or provider.
- Open Client applications—Variable result-set procedures can be used by Open Client applications.

If your procedure returns only one result set, use a **RESULT** clause. The presence of this clause prevents ODBC and Open Client applications from describing the result set again after a cursor is open.

To handle multiple result sets, ODBC must describe the currently executing cursor, not the procedure's defined result set. Therefore, ODBC does not always describe column names as defined in the **RESULT** clause of the procedure definition. To avoid this problem, use column aliases in the **SELECT** statement that generates the result set.

NO RESULT SET —Declares that this procedure returns no result set. This is useful when an external environment needs to know that a procedure does not return a result set.

SQL SECURITY—Defines whether the procedure is executed as the INVOKER (the user who is calling the procedure), or as the DEFINER (the user who owns the procedure). The default is DEFINER.

Extra memory is used when you specify SQL SECURITY INVOKER, because annotation must be done for each user that calls the procedure. Also, name resolution is performed as the invoker as well. Therefore, qualify all object names (tables, procedures, and so on) with their appropriate owner. For example, suppose `user1` creates this procedure:

```
CREATE PROCEDURE user1.myProcedure()
   RESULT( columnA INT )
   SQL SECURITY INVOKER
   BEGIN
       SELECT columnA FROM table1;
   END;
```

If `user2` attempts to run this procedure and a table `user2.table1` does not exist, a table lookup error results. Additionally, if a `user2.table1` does exist, that table is used instead of the intended `user1.table1`. To prevent this situation, qualify the table reference in the statement (`user1.table1`, instead of just `table1`).

If you use **ON EXCEPTION RESUME**, the procedure takes an action that depends on the setting of the **ON_TSQL_ERROR** option. If **ON_TSQL_ERROR** is set to **CONDITIONAL** (which is the default) the execution continues if the next statement handles the error; otherwise, it exits.

Error-handling statements include:

- **IF**
- **SELECT** @variable =
- **CASE**
- **LOOP**
- **LEAVE**
- **CONTINUE**
- **CALL**
- **EXECUTE**
- **SIGNAL**
- **RESIGNAL**
- **DECLARE**
- **SET VARIABLE**

Do not use explicit error-handling code with an **ON EXCEPTION RESUME** clause.

See *ON_TSQL_ERROR Option [TSQL]*.

AT location-string—Creates a *proxy stored procedure* on the current database for a remote procedure specified by *location-string*. The **AT** clause supports the semicolon (;) as a field delimiter in *location-string*. If no semicolon is present, a period is the field delimiter. This allows file names and extensions to be used in the database and owner fields.

Remote procedures can return only up to 254 characters in output variables.

If a remote procedure can return a result set, even if it does not return one in all cases, then the local procedure definition must contain a RESULT clause.

For information on remote servers, see *CREATE SERVER Statement*.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The Transact-SQL **CREATE PROCEDURE** statement is different.
- SQLJ—The syntax extensions for Java result sets are as specified in the proposed SQLJ1 standard.

Permissions

Watcom SQL or Transact SQL procedure to be owned by self – Requires CREATE PROCEDURE system privilege.

Watcom SQL or Transact SQL procedure to be owned by any user – Requires one of:

- CREATE ANY PROCEDURE system privilege.
- CREATE ANY OBJECT system privilege.

Remote procedure to be owned by self – Requires all of:

- CREATE EXTERNAL REFERENCE system privilege.
- CREATE PROCEDURE system privilege.

Remote procedure to be owned by any user – Requires CREATE EXTERNAL REFERENCE system privilege. Also requires one of:

- CREATE ANY PROCEDURE system privilege.
- CREATE ANY OBJECT system privilege.

See also

- *Referencing Temporary Tables Within Procedures* on page 165
- *BEGIN … END Statement* on page 81
- *CALL Statement* on page 86
- *CREATE PROCEDURE Statement [T-SQL]* on page 166
- *CREATE PROCEDURE Statement (External Procedures)* on page 168
- *CREATE SERVER Statement* on page 184
- *DROP Statement* on page 248
- *EXECUTE IMMEDIATE Statement [ESQL] [SP]* on page 272
- *GRANT EXECUTE Statement* on page 303
- *RAISERROR Statement [T-SQL]* on page 372
- *ON_TSQL_ERROR Option [TSQL]* on page 586

Referencing Temporary Tables Within Procedures

Sharing a temporary table between procedures can cause problems if the table definitions are inconsistent.

For example, suppose you have two procedures `procA` and `procB`, both of which define a temporary table, `temp_table`, and call another procedure called `sharedProc`. Neither `procA` nor `procB` has been called yet, so the temporary table does not yet exist.

Now, suppose that the `procA` definition for `temp_table` is slightly different than the definition in `procB`—while both used the same column names and types, the column order is different.

When you call `procA`, it returns the expected result. However, when you call `procB`, it returns a different result.

This is because when `procA` was called, it created `temp_table`, and then called `sharedProc`. When `sharedProc` was called, the **SELECT** statement inside of it was parsed and validated, and then a parsed representation of the statement is cached so that it can be used again when another **SELECT** statement is executed. The cached version reflects the column ordering from the table definition in `procA`.

Calling `procB` causes the temp_table to be recreated, but with different column ordering. When `procB` calls `sharedProc`, the database server uses the cached representation of the **SELECT** statement. So, the results are different.

You can avoid this from happening by doing one of the following:

- ensure that temporary tables used in this way are defined consistently
- consider using a global temporary table instead

CREATE PROCEDURE Statement [T-SQL]

Creates a new procedure that is compatible with Adaptive Server Enterprise.

Syntax

This subset of the Transact-SQL **CREATE PROCEDURE** statement is supported in SAP Sybase IQ:

```
CREATE [ OR REPLACE ] PROCEDURE [ owner.]procedure_name
… [ [ ( ] @parameter_name data-type [ = default ] [ OUTPUT ] [ , … ]
[ ) ] ]
…[ WITH RECOMPILE ]
… AS
… statement-list
```

Usage

Differences between Transact-SQL and SAP Sybase IQ SQL statements:

- Specifying a **CREATE OR REPLACE PROCEDURE** creates a new procedure, or replaces an existing procedure with the same name. This clause changes the definition of the procedure, but preserves existing permissions. Also, an error is returned if the procedure being replaced is already in use.
- Variable names prefixed by @—The “@” sign denotes a Transact-SQL variable name; SAP Sybase IQ variables can be any valid identifier and the @ prefix is optional.
- Input and output parameters—SAP Sybase IQ procedure parameters are specified as **IN**, **OUT**, or **INOUT**; Transact-SQL procedure parameters are **INPUT** parameters by default or

can be specified as **OUTPUT**. Those parameters declared as **INOUT** or as **OUT** in SAP Sybase IQ should be declared with **OUTPUT** in Transact-SQL.

- Parameter default values—SAP Sybase IQ procedure parameters are given a default value using the keyword DEFAULT; Transact-SQL uses an equality sign (=) to provide the default value.
- Returning result sets—SAP Sybase IQ uses a **RESULT** clause to specify returned result sets. In Transact-SQL procedures, the column names or alias names of the first query are returned to the calling environment:

```
CREATE PROCEDURE showdept @deptname varchar(30)
AS
  SELECT Employees.Surname, Employees.givenName
  FROM Departments, Employees
  WHERE Departments.DepartmentName = @deptname
  AND Departments.DepartmentID =
        Employees.DepartmentID
```

The corresponding SAP Sybase IQ procedure:

```
CREATE PROCEDURE showdept(in deptname
      varchar(30) )
RESULT ( lastname char(20), firstname char(20))
ON EXCEPTION RESUME
BEGIN
  SELECT Employees.SurName, Employees.GivenName
  FROM Departments, Employees
  WHERE Departments.DepartmentName = deptname
  AND Departments.DepartmentID =
        Employees.DepartmentID
END
```

- Procedure body—The body of a Transact-SQL procedure is a list of Transact-SQL statements prefixed by the AS keyword. The body of an SAP Sybase IQ procedure is a compound statement, bracketed by **BEGIN** and **END** keywords.

Note: There are two ways to create stored procedures: T-SQL and SQL/92. **BEGIN TRANSACTION**, for example, is T-SQL specific when using **CREATE PROCEDURE** syntax. Do not mix syntax when creating stored procedures.

Side Effects

- Automatic commit

Standards

- SQL—Transact-SQL extension to ISO/ANSI SQL grammar.
- Sybase—SAP Sybase IQ supports a subset of the Adaptive Server Enterprise **CREATE PROCEDURE** statement syntax.

  If the Transact-SQL **WITH RECOMPILE** optional clause is supplied, it is ignored. SQL Anywhere always recompiles procedures the first time they are executed after a database is started, and stores the compiled procedure until the database is stopped.

Groups of procedures are not supported.

Permissions

Watcom SQL or Transact SQL procedure to be owned by self – Requires CREATE PROCEDURE system privilege.

Watcom SQL or Transact SQL procedure to be owned by any user – Requires one of:

- CREATE ANY PROCEDURE system privilege.
- CREATE ANY OBJECT system privilege.

Remote procedure to be owned by self – Requires all of:

- CREATE EXTERNAL REFERENCE system privilege.
- CREATE PROCEDURE system privilege.

Remote procedure to be owned by any user – Requires CREATE EXTERNAL REFERENCE system privilege. Also requires one of:

- CREATE ANY PROCEDURE system privilege.
- CREATE ANY OBJECT system privilege.

See also

- *CREATE PROCEDURE Statement* on page 159

CREATE PROCEDURE Statement (External Procedures)

Creates an interface to a native or external procedure.

Syntax

```
CREATE [ OR REPLACE ] PROCEDURE [ owner.]procedure-name ( [ parameter, …] )
[ RESULT ( result-column, …) | NO RESULT SET ]
[   DYNAMIC RESULT SETS integer-expression ]
  [ SQL SECURITY { INVOKER | DEFINER } ]
[ EXTERNAL NAME 'external-call' [ LANGUAGE environment-name ]
```

Parameters

- **parameter –** *parameter_mode parameter-name data-type* [**DEFAULT** *expression*] | **SQLCODE** | **SQLSTATE**
- **parameter_mode – IN** | **OUT** | **INOUT**
- **result-column –** *column-name data-type*

- **environment-name – C_ESQL32** | **C_ESQL64** | **C_ODBC32** | **C_ODBC64** | **CLR** | **JAVA** | **PERL** | **PHP**

Usage

The body of a procedure consists of a compound statement. For information on compound statements, see *BEGIN … END Statement*.

Note: There are two ways to create stored procedures: ISO/ANSI SQL and T-SQL. **BEGIN TRANSACTION**, for example, is T-SQL specific when using **CREATE PROCEDURE** syntax. Do not mix syntax when creating stored procedures. See *CREATE PROCEDURE Statement [T-SQL]*.

CREATE PROCEDURE creates a procedure in the database. Users with the CREATE ANY OBJECT system privilege can create procedures for other users by specifying an owner. A procedure is invoked with a **CALL** statement.

If a stored procedure returns a result set, it cannot also set output parameters or return a return value.

When referencing a temporary table from multiple procedures, a potential issue can arise if the temporary table definitions are inconsistent and statements referencing the table are cached.

You can create permanent stored procedures that call external or native procedures written in a variety of programming languages. You can use **PROC** as a synonym for **PROCEDURE**.

- **Parameter Names –** Parameter names must conform to the rules for other database identifiers such as column names.

  Parameters can be prefixed with one of the keywords **IN**, **OUT**, or **INOUT**. If you do not specify one of these values, parameters are INOUT by default. The keywords mean:

  - IN—The parameter is an expression that provides a value to the procedure.
  - OUT—The parameter is a variable that could be given a value by the procedure.
  - INOUT—The parameter is a variable that provides a value to the procedure, and could be given a new value by the procedure.

  Note: TABLE parameters cannot be declared as INOUT or OUT. See *CREATE PROCEDURE Statement (Table UDF)*.

  When procedures are executed using **CALL**, not all parameters need to be specified. If a default value is provided in the **CREATE PROCEDURE** statement, missing parameters are assigned the default values. If an argument is not provided in the **CALL** statement, and no default is set, an error is given.

  Note: You cannot **CALL** a table UDF. Use the **CREATE PROCEDURE** statement.

  SQLSTATE and **SQLCODE** are special **OUT** parameters that output the **SQLSTATE** or **SQLCODE** value when the procedure ends. Whether or not a **SQLSTATE** and **SQLCODE**

parameter is specified, the **SQLSTATE** and **SQLCODE** special values can always be checked immediately after a procedure call to test the return status of the procedure.

The **SQLSTATE** and **SQLCODE** special values are modified by the next SQL statement. Providing **SQLSTATE** or **SQLCODE** as procedure arguments allows the return code to be stored in a variable.

- **OR REPLACE –** Specifying **OR REPLACE** (**CREATE OR REPLACE PROCEDURE**) creates a new procedure, or replaces an existing procedure with the same name. This clause changes the definition of the procedure, but preserves existing permissions. An error is returned if you attempt to replace a procedure that is already in use.

  You cannot create TEMPORARY external call procedures.
- **RESULT –** Declares the number and type of columns in the result set. The parenthesized list following the **RESULT** keyword defines the result column names and types. This information is returned by the Embedded SQL **DESCRIBE** or by ODBC **SQLDescribeCol** when a **CALL** statement is being described. Allowed data types are listed in *Reference: Building Blocks, Tables, and Procedures > SQL Data Types*.

  Procedures that call into Embedded SQL (LANGUAGE C_ESQL32, LANGUAGE C_ESQL64) or ODBC (LANGUAGE C_ODBC32, LANGUAGE C_ODBC64) external functions can return 0 or 1 result sets.

  Procedures that call into Perl or PHP (LANGUAGE PERL, LANGUAGE PHP) external functions cannot return result sets. Procedures that call native functions loaded by the database server cannot return result sets.

  Procedures that call into CLR or Java (LANGUAGE CLR, LANGUAGE JAVA) external functions can return 0, 1, or more result sets.
- **NO RESULT SET –** Declares that this procedure returns no result set. This is useful when an external environment needs to know that a procedure does not return a result set.
- **DYNAMIC RESULT SETS –** Use this clause with LANGUAGE CLR and LANGUAGE JAVA calls. This clause is meaningful only if you specify LANGUAGE. If you specify a RESULT clause, DYNAMIC RESULT SETS defaults to 1. If you do not specify a RESULT clause, DYNAMIC RESULT SETS defaults to 0. Note that procedures that call into Perl or PHP (LANGUAGE PERL, LANGUAGE PHP) external functions cannot return result sets. Procedures that call native functions loaded by the database server cannot return result sets.
- **SQL SECURITY –** Defines whether the procedure is executed as the INVOKER (the user who is calling the procedure), or as the DEFINER (the user who owns the procedure). The default is DEFINER. For external calls, this clause establishes the ownership context for unqualified object references in the external environment.

  When SQL SECURITY INVOKER is specified, more memory is used because annotation must be done for each user that calls the procedure. Also, when SQL SECURITY INVOKER is specified, name resolution is done as the invoker as well. Therefore, care should be taken to qualify all object names (tables, procedures, and so on) with their appropriate owner. For example, suppose `user1` creates this procedure:

```
CREATE PROCEDURE user1.myProcedure()
    RESULT( columnA INT )
    SQL SECURITY INVOKER
    BEGIN
        SELECT columnA FROM table1;
    END;
```

If `user2` attempts to run this procedure and a table `user2.table1` does not exist, a table lookup error results. Additionally, if `user2.table1` does exist, that table is used instead of the intended `user1.table1`. To prevent this situation, qualify the table reference in the statement (`user1.table1`, instead of just `table1`).

- **EXTERNAL NAME LANGUAGE –** EXTERNAL NAME LANGUAGE 'native-call' *native-call*:[*operating-system*:]*function-name@library*; ...

  A procedure that uses **EXTERNAL NAME** with a **LANGUAGE JAVA** clause is a wrapper around a Java method.

  operating-system: UNIX—A procedure using the **EXTERNAL NAME** clause with no LANGUAGE attribute defines an interface to a native function written in a programming language such as C. The native function is loaded by the database server into its address space.

  The library name can include the file extension, which is typically `.dll` on Windows and `.so` on UNIX. In the absence of the extension, the software appends the platform-specific default file extension for libraries. This is a formal example:

  ```
  CREATE PROCEDURE mystring( IN instr LONG VARCHAR )
  EXTERNAL NAME
  'mystring@mylib.dll;Unix:mystring@mylib.so';
  ```

  A simpler way to write the preceding **EXTERNAL NAME** clause, using platform-specific defaults:

  ```
  CREATE PROCEDURE mystring( IN instr LONG VARCHAR )
  EXTERNAL NAME 'mystring@mylib';
  ```

  When called, the library containing the function is loaded into the address space of the database server. The native function executes as part of the server. In this case, if the function causes a fault, then the database server terminates. Because of this, loading and executing functions in an external environment using the LANGUAGE attribute is recommended. If a function causes a fault in an external environment, the database server continues to run.

  EXTERNAL NAME LANGUAGE 'c-call' LANGUAGE { C_ESQL32 | C_ESQL64 | C_ODBC32 | C_ODBC64 } *c-call*:

  [*operating-system*:]*function-name@library*; ...

  operating-system: **UNIX**

  To call a compiled native C function in an external environment instead of within the database server, the stored procedure or function is defined with the **EXTERNAL NAME**

clause followed by the LANGUAGE attribute specifying one of C_ESQL32, C_ESQL64, C_ODBC32, or C_ODBC64.

When the LANGUAGE attribute is specified, then the library containing the function is loaded by an external process and the external function will execute as part of that external process. In this case, if the function causes a fault, then the database server will continue to run.

Sample procedure definition:

```
CREATE PROCEDURE ODBCinsert(
IN ProductName CHAR(30),
IN ProductDescription CHAR(50)
)
NO RESULT SET
EXTERNAL NAME 'ODBCexternalInsert@extodbc.dll'
LANGUAGE C_ODBC32;
```

EXTERNAL NAME 'clr-call' LANGUAGE CLR *clr-call* : *dll-name*::*function-name* (*param-type-1*, ...)

operating-system: **UNIX**

To call a .NET function in an external environment, the procedure interface is defined with an **EXTERNAL NAME** clause followed by the LANGUAGE CLR attribute.

A CLR stored procedure or function behaves the same as a SQL stored procedure or function with the exception that the code for the procedure or function is written in a .NET language such as C# or Visual Basic, and the execution of the procedure or function takes place outside the database server (that is, within a separate .NET executable).

Sample procedure definition:

```
CREATE PROCEDURE clr_interface(
IN p1 INT,
IN p2 UNSIGNED SMALLINT,
OUT p3 LONG VARCHAR)
NO RESULT SET
EXTERNAL NAME 'CLRlib.dll::CLRproc.Run( int, ushort, out
string )'
LANGUAGE CLR;
```

EXTERNAL NAME 'perl-call' LANGUAGE CLR *perl-call*:

< **file=***perl-call* > **$sa_perl_return=***perl-sub* (**$sa_perl_arg0**, ...)

To call a Perl function in an external environment, the procedure interface is defined with an **EXTERNAL NAME** clause followed by the LANGUAGE PERL attribute.

A Perl stored procedure or function behaves the same as a SQL stored procedure or function with the exception that the code for the procedure or function is written in Perl and the execution of the procedure or function takes place outside the database server (that is, within a Perl executable instance).

Sample procedure definition:

```
CREATE PROCEDURE PerlWriteToConsole( IN str LONG VARCHAR)
NO RESULT SET
EXTERNAL NAME '<file=PerlConsoleExample>
WriteToServerConsole( $sa_perl_arg0 )'
LANGUAGE PERL;
```

EXTERNAL NAME 'perl-call' LANGUAGE PHP <**file=***php-file*> **print** *php-func*(**$argv[1]**, ...)

To call a PHP function in an external environment, the procedure interface is defined with an **EXTERNAL NAME** clause followed by the LANGUAGE PHP attribute.

A PHP stored procedure or function behaves the same as a SQL stored procedure or function with the exception that the code for the procedure or function is written in PHP and the execution of the procedure or function takes place outside the database server (that is, within a PHP executable instance).

Sample procedure definition:

```
CREATE PROCEDURE PHPPopulateTable()
NO RESULT SET
EXTERNAL NAME '<file=ServerSidePHPExample>
ServerSidePHPSub()'
LANGUAGE PHP;
```

EXTERNAL NAME java-call LANGUAGE JAVA '*java-call*' [*package-name.*] *class-name.method-name* (*method-signature*

method-signature: ([*field-descriptor*, ...]) *return-descriptor*

A Java method signature is a compact character representation of the types of the parameters and the type of the return value.

To call a Java method in an external environment, the procedure interface is defined with an **EXTERNAL NAME** clause followed by the LANGUAGE JAVA attribute.

A Java-interfacing stored procedure or function behaves the same as a SQL stored procedure or function with the exception that the code for the procedure or function is written in Java and the execution of the procedure or function takes place outside the database server (that is, within a Java Virtual Machine).

Sample procedure definition:

```
CREATE PROCEDURE HelloDemo( IN
name LONG VARCHAR )
NO RESULT SET
EXTERNAL NAME 'Hello.main([Ljava/lang/String;)V'
LANGUAGE JAVA;
```

Table 7. Java Field-descriptor and Return-descriptor

Field type	Java data type
B	byte
C	char
D	double
F	float
I	int
J	long
L*class-name*;	an instance of the *class-name* class. The class name must be fully qualified, and any dot in the name must be replaced by a backslash. For example, **java/lang/String**
S	short
V	void
Z	boolean
[	use one for each dimension of an array

For example:

```
double some_method(
  boolean a,
  int b,
  java.math.BigDecimal c,
  byte [][] d,
  java.sql.ResultSet[] d ) {
}
```

has this signature:

```
'(ZILjava/math/BigDecimal;[[B[Ljava/sql/ResultSet;)D'
```

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The Transact-SQL **CREATE PROCEDURE** statement is different.
- SQLJ—The syntax extensions for Java result sets are as specified in the proposed SQLJ1 standard.

Permissions

External procedure to be owned by self – Requires:

- CREATE EXTERNAL REFERENCE system privilege.
- CREATE PROCEDURE system privilege.

External procedure to be owned by any user – Requires CREATE EXTERNAL REFERENCE system privilege. Also requires one of:

- CREATE ANY PROCEDURE system privilege.
- CREATE ANY OBJECT system privilege.

See also

- *ALTER PROCEDURE Statement* on page 35
- *BEGIN … END Statement* on page 81
- *CALL Statement* on page 86
- *CREATE PROCEDURE Statement* on page 159
- *CREATE PROCEDURE Statement [T-SQL]* on page 166
- *DROP Statement* on page 248
- *EXECUTE IMMEDIATE Statement [ESQL] [SP]* on page 272
- *GRANT EXECUTE Statement* on page 303

CREATE PROCEDURE Statement (Java UDF)

Creates an interface to an external Java table UDF.

CREATE PROCEDURE Statement reference information for external procedures is located in a separate topic. **CREATE PROCEDURE** Statement reference information for table UDFs is located in a separate topic.

If your query references SAP Sybase IQ tables, note that different syntax and parameters apply compared to a query that references only catalog store tables.

Java table UDFs are only supported in the **FROM** clause.

Syntax

For a query referencing at least one SAP Sybase IQ table:

```
CREATE [ OR REPLACE ] PROCEDURE
[ owner.]procedure-name ( [ parameter, …] )
[ RESULT (result-column, ...)]
[ SQL SECURITY { INVOKER | DEFINER } ]
EXTERNAL NAME 'java-call' [ LANGUAGE Java ] }
```

For a query referencing catalog store tables only:

```
CREATE [ OR REPLACE ] PROCEDURE
[ owner.]procedure-name ( [ parameter, …] )
[ RESULT (result-column, ...)]
| NO RESULT SET
[ DYNAMIC RESULT SETS integer-expression ]
```

```
[ SQL SECURITY { INVOKER | DEFINER } ]
EXTERNAL NAME 'java-call' [ LANGUAGE Java ] }
```

Parameters

- **parameter –** For a query referencing at least one SAP Sybase IQ table:

  [**IN** *parameter_mode parameter-name data-type* [**DEFAULT** *expression*]

  For a query referencing catalog store tables only:

  [**IN** | **OUT** | **INOUT**] *parameter_mode parameter-name data-type* [**DEFAULT** *expression*]
- **result-column –** column-name data-type
- **JAVA – [ALLOW | DISALLOW SERVER SIDE REQUESTS]**
- **java-call – '[package-name.]class-name.method-name method-signature'**

Usage

For Java table functions, exactly one result set is allowed. If the Java table functions are joined with an SAP Sybase IQ table or if a column from an SAP Sybase IQ table is an argument to the Java table function then only one result set is supported.

If the Java table function is the only item in the **FROM** clause then *N* number of result sets are allowed.

JAVA: [ALLOW | DISALLOW SERVER SIDE REQUESTS]:

DISALLOW is the default.

ALLOW indicates that server-side connections are allowed.

Note: Do not specify **ALLOW** unless necessary. A setting of **ALLOW** slows down certain types of SAP Sybase IQ table joins. If you change a procedure definition from **ALLOW** to **DISALLOW**, or vice-versa, the change will not be recognized until you make a new connection.

Do not use UDFs with both **ALLOW SERVER SIDE REQUESTS** and **DISALLOW SERVER SIDE REQUESTS** in the same query.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The Transact-SQL **CREATE PROCEDURE** statement is different.
- SQLJ—The syntax extensions for Java result sets are as specified in the proposed SQLJ1 standard.

Permissions

Unless creating a temporary procedure, a user must have the CREATE PROCEDURE system privilege to create a procedure for themselves. To create UDF procedure for others, a user must specify an owner and have either the CREATE ANY PROCEDURES or CREATE ANY

OBJECT system privilege. If a procedure has an external reference, a user must also have the CREATE EXTERNAL REFERENCE system privilege, in addition to the previously mentioned system privileges, regardless of whether or not they are the owner of procedure.

CREATE PROCEDURE Statement (Table UDF)

Creates an interface to an external table user-defined function (table UDF). Users must be specifically licensed to use table UDFs.

You define table UDFs using the `a_v4_extfn` API. **CREATE PROCEDURE** statement reference information for external procedures that do not use the `a_v3_extfn` or `a_v4_extfn` APIs is located in a separate topic. **CREATE PROCEDURE** statement reference information for Java UDFs is located in a separate topic.

Syntax

```
CREATE [ OR REPLACE ] PROCEDURE
[ owner.]procedure-name ( [ parameter[, …]] )
| RESULT  result-column [, …] )
[ SQL SECURITY { INVOKER | DEFINER } ]
EXTERNAL NAME 'external-call'
```

Parameters

- **parameter: –** [**IN**] *parameter-name data-type* [**DEFAULT** *expression*]

  | [**IN**] *parameter-name table-type*
- **table-type: –** TABLE(*column-name data-type* [, ...])
- **external-call: –** [*column-name*:]*function-name@library*; ...

Usage

The **CREATE PROCEDURE** statement creates a procedure in the database. To create a procedure for themselves, a user must have the CREATE PROCEDURE system privilege. To create a procedure for others, a user must specify the owner of the procedure and must have either the CREATE ANY PROCEDURE or CREATE ANY OBJECT system privilege. If the procedure contains an external reference, the user must have the CREATE EXTERNAL REFERENCE system privilege in addition to previously mentioned system privileges, regardless of who owns the procedure.

If a stored procedure returns a result set, it cannot also set output parameters or return a return value.

When referencing a temporary table from multiple procedures, a potential issue can arise if the temporary table definitions are inconsistent and statements referencing the table are cached. Use caution when referencing temporary tables within procedures.

You can use the **CREATE PROCEDURE** statement to create external table UDFs implemented in a different programming language than SQL. However, be aware of the table UDF restrictions before creating external UDFs.

The data type for a scalar parameter, a result column, and a column of a TABLE parameter must be a valid SQL data type.

Parameter names must conform to the rules for other database identifiers such as column names. They must be a valid SQL data type.

TPFs support a mix scalar parameters and single table parameter. A TABLE parameter must define a schema for an input set of rows to be processed by the UDF. The definition of a TABLE parameter includes column names and column data types.

```
TABLE(c1 INT, c2 CHAR(20))
```

The above example defines a schema with the two columns c1 and c2 of types INT and CHAR(20). Each row processed by the UDF must be a tuple with two (2) values. Table parameters, unlike scalar parameters cannot be assigned a default value.

- **IN keyword –** Parameters can be prefixed with the keyword IN:
  - IN—The parameter is an object that provides a value for a scalar parameter or a set of values for a TABLE parameter to the UDF.

  Note: TABLE parameters cannot be declared as INOUT or OUT. You can only have one table parameter (the position of which is not important).
- **OR REPLACE –** Specifying **OR REPLACE** (**CREATE OR REPLACE PROCEDURE**) creates a new procedure, or replaces an existing procedure with the same name. This clause changes the definition of the procedure, but preserves existing permissions. An error is returned if you attempt to replace a procedure that is already in use.
- **RESULT –** Declares the column names and their data types for the result set of the external UDF. The data types of the columns must be a valid SQL data type (e.g., a column in the result set cannot have TABLE as data type). The set of datums in the result implies the TABLE. External UDFs can only have one result set of type TABLE.

  Note: TABLE is not an output value. A table UDF cannot have LONG VARBINARY or LONG VARCHAR data types in its result set, but a table parameterized function (TPF) can have large object (LOB) data in its result set.

  A TPF cannot produce LOB data, but can have columns in the result set as LOB data types. However, the only way to get LOB data in the output is to pass a column from an input table to the output table. The describe attribute `EXTFNAPIV4_DESCRIBE_COL_VALUES_SUBSET_OF_INPUT` allows this, as illustrated in the sample file `tpf_blob.cxx`.
- **SQL SECURITY –** Defines whether the procedure is executed as the INVOKER (the user who is calling the UDF), or as the DEFINER (the user who owns the UDF). The default is DEFINER.

When SQL SECURITY INVOKER is specified, more memory is used because annotation must be done for each user that calls the procedure. Also, when SQL SECURITY INVOKER is specified, name resolution is done as the invoker as well. Therefore, care should be taken to qualify all object names (tables, procedures, and so on) with their appropriate owner. For example, suppose user1 creates this procedure:

```
CREATE PROCEDURE user1.myProcedure()
    RESULT( columnA INT )
    SQL SECURITY INVOKER
    BEGIN
        SELECT columnA FROM table1;
    END;
```

If user2 attempts to run this procedure and a table user2.table1 does not exist, a table lookup error results. Additionally, if a user2.table1 does exist, that table is used instead of the intended user1.table1. To prevent this situation, qualify the table reference in the statement (user1.table1, instead of just table1).

- **EXTERNAL NAME –** EXTERNAL NAME *'external-call'*: *external-call*: [*operating-system*:]*function-name@library*; ....

  An external UDF must have **EXTERNAL NAME** clause which defines an interface to a function written in a programming language such as C. The function is loaded by the database server into its address space.

  The library name can include the file extension, which is typically .dll on Windows and .so on UNIX. In the absence of the extension, the software appends the platform-specific default file extension for libraries. This is a formal example.

```
CREATE PROCEDURE mystring( IN instr CHAR(255),
    IN input_table TABLE(A INT) )
    RESULT (CHAR(255))
EXTERNAL NAME
'mystring@mylib.dll;Unix:mystring@mylib.so'
```

  A simpler way to write the preceding EXTERNAL NAME clause, using platform-specific defaults, is as follows:

```
CREATE PROCEDURE mystring( IN instr CHAR(255),
    IN input_table TABLE(A INT) )
    RESULT (CHAR(255))
EXTERNAL NAME 'mystring@mylib'
```

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The Transact-SQL **CREATE PROCEDURE** statement is different.
- SQLJ—The syntax extensions for Java result sets are as specified in the proposed SQLJ1 standard.

Permissions

Unless creating a temporary procedure, a user must have the CREATE PROCEDURE system privilege to create a UDF for themselves. To create a UDF for others, they must specify the owner of the procedure and must have either the CREATE ANY PROCEDURE or CREATE ANY OBJECT system privilege. If the procedure contains an external reference, a user must also have the CREATE EXTERNAL REFERENCE system privilege, in addition to the previously mentioned system privileges.

CREATE ROLE Statement

Creates a new role, extends an existing user to act as a role, or manages role administrators on a role.

Syntax

```
CREATE [ OR REPLACE ] ROLE role_name | FOR USER userID
[ WITH ADMIN [ ONLY ] admin_name [,...] ]
```

Parameters

- **role_name –** unless you are using the OR REPLACE clause, *role_name* cannot already exist in the database.
- **OR REPLACE –** *role_name* must already exist in the database. All current administrators are replaced by those specified in *admin_name [,...]* clause.
- **FOR USER –** when using the FOR USER clause without the OR REPLACE, *userID* must be the name of an existing user that currently does not have the ability to act as a role.
- **admin_name –** list of users to be designated administrators of the role.
- **WITH ADMIN –** each *admin_name* specified is granted administrative privileges over the role in addition to all underlying system privileges.
- **WITH ADMIN ONLY –** each *admin_name* specified is granted administrative privileges only over the role, not the underlying system privileges.

Note: If you do not specify an ADMIN clause, the default WITH ADMIN ONLY clause is used and the default administrator is the global roles administrator.

Examples

- **Example 1 –** creates the role `Sales` as a standalone role. Since no role administrator is specified, any user with the global role administrator is the default administrator of this role.

  ```
  CREATE ROLE Sales
  ```

- **Example 2 –** extends the role for existing user `Jane`.

```
CREATE OR REPLACE ROLE FOR USER Jane
```

- **Example 3 –** creates the role `Finance` with `Mary` and `Jeff` as role administrators with administrative rights only to the role.

```
CREATE ROLE Finance
WITH ADMIN ONLY Mary, Jeff
```

- **Example 4 –** if `Finance` is an existing role with `Mary` and `Jeff` with role administrators, this statement replaces `Mary` and `Jeff` with `Bob` and `Sarah` as role administrators, this time with administrative rights to the role.

```
CREATE OR REPLACE ROLE Finance
WITH ADMIN Bob, Sarah
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

- Create a new role – Requires the MANAGE ROLES system privilege.
- OR REPLACE clause – Requires the MANAGE ROLES system privilege along with administrative rights over the role being replaced.

CREATE SCHEMA Statement

Creates a schema, which is a collection of tables, views, and permissions and their associated permissions, for a database user.

Syntax

```
CREATE SCHEMA AUTHORIZATION userid
... [ { create-table-statement
| create-view-statement
| grant-statement } ] …
```

Usage

The *userid* must be the user ID of the current connection. You cannot create a schema for another user. The user ID is not case-sensitive.

If any of the statements in the **CREATE SCHEMA** statement fail, the entire **CREATE SCHEMA** statement is rolled back.

CREATE SCHEMA statement is simply a way to collect individual **CREATE** and **GRANT** statements into one operation. There is no `SCHEMA` database object created in the database, and to drop the objects you must use individual **DROP TABLE** or **DROP VIEW** statements. To revoke permissions, use a **REVOKE** statement for each permission granted.

Note: The **CREATE SCHEMA** statement is invalid on an active multiplex.

Individual **CREATE** or **GRANT** statements are not separated by statement delimiters. The statement delimiter marks the end of the **CREATE SCHEMA** statement itself.

The individual **CREATE** or **GRANT** statements must be ordered such that the objects are created before permissions are granted on them.

Creating more than one schema for a user is not recommended and might not be supported in future releases.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—SAP Sybase IQ does not support the use of **REVOKE** statements within the **CREATE SCHEMA** statement, and does not allow its use within Transact-SQL batches or procedures.

Permissions

Requires the CREATE ANY OBJECT system privilege.

See also

- *CREATE TABLE Statement* on page 197
- *CREATE VIEW Statement* on page 227
- *GRANT CREATE Statement* on page 300

CREATE SEQUENCE statement

Creates a sequence that can be used to generate primary key values that are unique across multiple tables, and for generating default values for a table. This statement applies to SAP Sybase IQ catalog store tables only.

Syntax

```
CREATE [ OR REPLACE  ] SEQUENCE [ owner.] sequence-name
[ INCREMENT BY signed-integer ]
[ START WITH signed-integer ]
[ MINVALUE signed-integer  |  NO MINVALUE  ]
[ MAXVALUE signed-integer  |  NO MAXVALUE  ]
[ CACHE integer  |  NO CACHE  ]
[ CYCLE  |  NO CYCLE  ]
```

Parameters

OR REPLACE clause – Specifying OR REPLACE creates a new sequence, or replaces an existing sequence with the same name. If you do not use the OR REPLACE clause, an error is returned if you specify the name of a sequence that already exists for the current user.

INCREMENT BY clause – Defines the amount the next sequence value is incremented from the last value assigned. The default is 1. Specify a negative value to generate a descending sequence. An error is returned if the INCREMENT BY value is 0.

START WITH clause – Defines the starting sequence value. If you do not specify a value for the START WITH clause, MINVALUE is used for ascending sequences and MAXVALUE is used for descending sequences. An error is returned if the START WITH value is beyond the range specified by MINVALUE or MAXVALUE.

MINVALUE clause – Defines the smallest value generated by the sequence. The default is 1. An error is returned if MINVALUE is greater than (2^63-1) or less than -(2^63-1). An error is also returned if MINVALUE is greater than MAXVALUE.

MAXVALUE clause – Defines the largest value generated by the sequence. The default is 2^63-1. An error is returned if MAXVALUE is greater than 2^63-1 or less than -(2^63-1).

CACHE clause – Specifies the number of preallocated sequence values that are kept in memory for faster access. When the cache is exhausted, the sequence cache is repopulated and a corresponding entry is written to the transaction log. At checkpoint time, the current value of the cache is forwarded to the ISYSSEQUENCE system table. The default is 100.

CYCLE clause – Specifies whether values should continue to be generated after the maximum or minimum value is reached.

The default is NO CYCLE, which returns an error once the maximum or minimum value is reached.

Remarks

A sequence is a database object that allows the automatic generation of numeric values. A sequence is not bound to a specific or unique table column and is only accessible through the table column to which it is applied.

Sequences can generate values in one of the following ways:

- Increment or decrement monotonically without bound
- Increment or decrement monotonically to a user-defined limit and stop
- Increment or decrement monotonically to a user-defined limit and cycle back to the beginning and start again

You control the behavior when the sequence runs out of values using the CYCLE clause.

If a sequence is increasing and it exceeds the MAXVALUE, MINVALUE is used as the next sequence value if CYCLE is specified. If a sequence is decreasing and it falls below

MINVALUE, MAXVALUE is used as the next sequence value if CYCLE is specified. If CYCLE is not specified, an error is returned.

Sequence values cannot be used with views or materialized view definitions.

Privileges
You must have the CREATE ANY SEQUENCE or CREATE ANY OBJECT system privilege to create sequences.

Side effects
None

Standards and compatibility

- **SQL/2008 –** Sequences comprise SQL/2008 language feature T176. SAP Sybase IQ does not allow optional specification of the sequence data type—this behavior can be achieved with a CAST when using the sequence.

  In addition, the following are vendor extensions:

  CACHE clause
  OR REPLACE syntax
  CURRVAL expression
  Use of sequences in DEFAULT expressions

Example

The following example creates a sequence named Test that starts at 4, increments by 2, does not cycle, and caches 15 values at a time:

```
CREATE SEQUENCE Test
START WITH 4
INCREMENT BY 2
NO MAXVALUE
NO CYCLE
CACHE 15;
```

CREATE SERVER Statement

Adds a server to the `ISYSSERVER` table.

Syntax

```
CREATE SERVER server-name
CLASS 'server-class'
USING 'connection-info'
[ READ ONLY ]
```

Parameters

- **server-class –** { **ASAJDBC** | **ASEJDBC** | **SAODBC** | **ASEODBC** | **DB2ODBC** | **MSSODBC** | **ORAODBC** | **ODBC** }
- **connection-info –** { *machine-name:port-number* [*/dbname*] | *data-source-name* }

Examples

- **Example 1 –** Create a remote server for the JDBC-based Adaptive Server Enterprise server named `ase_prod`. Its machine name is “banana” and port number is 3025.

```
CREATE SERVER ase_prod
CLASS 'asejdbc'
USING 'banana:3025'
```

- **Example 2 –** Create a SQL Anywhere remote server named `testasa` on the machine “apple” with listening on port number 2638.

```
CREATE SERVER testasa
CLASS 'asajdbc'
USING 'apple:2638'
```

- **Example 3 –** Create a remote server for the Oracle server named `oracle723`. Its ODBC Data Source Name is “oracle723.”

```
CREATE SERVER oracle723
CLASS 'oraodbc'
USING 'oracle723'
```

Usage

CREATE SERVER defines a remote server from the SAP Sybase IQ catalogs.

- **USING clause –** if a JDBC-based server class is used, the **USING** clause is *hostname:port-number [/dbname]* where:
  - hostname—Is the machine on which the remote server runs.
  - portnumber—Is the TCP/IP port number on which the remote server listens. The default port number for SAP Sybase IQ and SQL Anywhere is 2638.
  - dbname—For SQL Anywhere remote servers, if you do not specify a *dbname*, the default database is used. For Adaptive Server Enterprise, the default is the **master** database, and an alternative to using *dbname* is to another database by some other means (for example, in the **FORWARD TO** statement).

  If an ODBC-based server class is used, the **USING** clause is the *data-source-name*. The data-source-name is the ODBC Data Source Name.
- **READ ONLY clause –** the **READ ONLY** clause specifies that the remote server is a read-only data source. Any update request is rejected by SAP Sybase IQ.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

Requires the SERVER OPERATOR system privilege.

See also

- *ALTER SERVER Statement* on page 41
- *DROP SERVER Statement* on page 261

CREATE SERVICE Statement

Permits a database server to act as a Web server.

Syntax

```
CREATE SERVICE service-name
TYPE service-type-string
[ attributes ] [
AS statement ]
```

Parameters

- **attributes –** [**AUTHORIZATION** { **ON** | **OFF** }] [**SECURE** { **ON** | **OFF** }] [**USER** { *user-name* | **NULL** }] [**URL** [**PATH**/] { **ON** | **OFF** | **ELEMENTS** }] [**USING** { *SOAP-prefix* | **NULL** }]
- **service-type-string –** { '**RAW** ' | '**HTML** ' | '**XML** ' | '**SOAP** ' | ' **DISH** ' }

Examples

- **Example 1 –** Set up a Web server quickly, start a database server with the `-xs` switch, then execute this statement:

  ```
  CREATE SERVICE tables TYPE 'HTML'
  AUTHORIZATION OFF    USER DBA
  ```

  ```
  AS SELECT * FROM SYS.ISYSTAB
  ```

  After executing this statement, use any Web browser to open the URL `http://localhost/tables`.

Usage

The **CREATE SERVICE** statement causes the database server to act as a web server. A new entry is created in the SYSWEBSERVICE system table.

- **service clause –** name—Web service names may be any sequence of alphanumeric characters or "/", "-", "_", ".", "!", "~", "*", "'", "(", or ")", except that the first character cannot begin with a slash (/) and the name cannot contain two or more consecutive slash characters.
- **service-type-string clause –** identifies the type of the service. The type must be one of the listed service types. There is no default value.
- **AUTHORIZATION clause –** determines whether users must specify a user name and password when connecting to the service. If authorization is OFF, the **AS** clause is required and a single user must be identified by the **USER** clause. All requests are run using that user's account and permissions.

  If authorization is ON, all users must provide a user name and password. Optionally, you can limit the users that are permitted to use the service by providing a user or role name using the **USER** clause. If the user name is NULL, all known users can access the service.

  The default value is ON. Run production systems with authorization turned on. Grant permission to use the service by adding users to a role.
- **SECURE clause –** indicates whether unsecure connections are accepted. ON indicates that only HTTPS connections are to be accepted. Service requests received on the HTTP port are automatically redirected to the HTTPS port. If set to OFF, both HTTP and HTTPS connections are accepted. The default value is OFF.
- **USER clause –** if authorization is disabled, this parameter becomes mandatory and specifies the user ID used to execute all service requests. If authorization is enabled (the default), this optional clause identifies the user or role permitted access to the service. The default value is NULL, which grants access to all users.
- **URL clause –** determines whether URI paths are accepted and, if so, how they are processed. OFF indicates that nothing must follow the service name in a URI request. ON indicates that the remainder of the URI is interpreted as the value of a variable named *url*. **ELEMENTS** indicates that the remainder of the URI path is to be split at the slash characters into a list of up to 10 elements. The values are assigned to variables named url plus a numeric suffix of between 1 and 10; for example, the first three variable names are url1, url2, and url3. If fewer than 10 values are supplied, the remaining variables are set to NULL. If the service name ends with the character /, then URL must be set to OFF. The default value is OFF.
- **USING clause –** applies only to DISH services. The parameter specifies a name prefix. Only SOAP services whose names begin with this prefix are handled.
- **statement claues –** if the statement is NULL, the URI must specify the statement to be executed. Otherwise, the specified SQL statement is the only one that can be executed

through the service. The statement is mandatory for SOAP services, and ignored for DISH services. The default value is NULL.

All services that are run in production systems must define a statement. The statement can be NULL only if authorization is enabled.

- **RAW clause –** the result set is sent to the client without any further formatting. You can produce formatted documents by generating the required tags explicitly within your procedure, as demonstrated in an example, below.
- **HTML clause –** the result set of a statement or procedure is automatically formatted into an HTML document that contains a table.
- **XML clause –** the result set is assumed to be in XML format. If it is not already so, it is automatically converted to XML RAW format.
- **SOAP clause –** the request must be a valid Simple Object Access Protocol, or SOAP, request. The result set is automatically formatted as a SOAP response. For more information about the SOAP standards, see *www.w3.org/TR/SOAP*.
- **DISH clause –** a Determine SOAP Handler, or DISH, service acts as a proxy for one or more SOAP services. In use, it acts as a container that holds and provides access to a number of SOAP services. A Web Services Description Language (WSDL) file is automatically generated for each of the included SOAP services. The included SOAP services are identified by a common prefix, which must be specified in the **USING** clause.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY WEB SERVICE system privilege.

See also

- *ALTER SERVICE Statement* on page 43
- *DROP SERVICE Statement* on page 262

CREATE SPATIAL REFERENCE SYSTEM Statement

Creates or replaces a spatial reference system.

Syntax

```
{ CREATE [ OR REPLACE ] SPATIAL REFERENCE SYSTEM
    | CREATE SPATIAL REFERENCE SYSTEM IF NOT EXISTS }
```

```
    srs-name
    [ srs-attribute ] [ srs-attribute ... ]

srs-name : string

srs-attribute:
    IDENTIFIED BY srs-id
    | DEFINITION { definition-string | NULL }
    | ORGANIZATION { organization-name IDENTIFIED BY organization-srs-id
| NULL }
    | TRANSFORM DEFINITION { transform-definition-string | NULL }
    | LINEAR UNIT OF MEASURE linear-unit-name
    | ANGULAR UNIT OF MEASURE { angular-unit-name | NULL }
    | TYPE { ROUND EARTH | PLANAR }
    | COORDINATE coordinate-name { UNBOUNDED | BETWEEN low-number
AND high-number }
    | ELLIPSOID SEMI MAJOR AXIS semi-major-axis-length { SEMI MINOR AXIS
semi-minor-axis-length | INVERSE FLATTENING inverse-flattening-
ratio }
    | SNAP TO GRID { grid-size | DEFAULT }
    | TOLERANCE { tolerance-distance | DEFAULT }
    | POLYGON FORMAT polygon-format
    | STORAGE FORMAT storage-format

srs-id : integer
semi-major-axis-length : number
semi-minor-axis-length : number
inverse-flattening-ratio : number
grid-size : DOUBLE : usually between 0 and 1
tolerance-distance : number
axis-order : { 'x/y/z/m' | 'long/lat/z/m' | 'lat/long/z/m' }
polygon-format : { 'CounterClockWise' | 'Clockwise' | 'EvenOdd' }
storage-format : { 'Internal' | 'Original' | 'Mixed'
```

}

Parameters

- **OR REPLACE clause –** Specifying OR REPLACE creates the spatial reference system if it does not already exist in the database, and replaces it if it does exist. An error is returned if you attempt to replace a spatial reference system while it is in use. An error is also returned if you attempt to replace a spatial reference system that already exists in the database without specifying the OR REPLACE clause.
- **CREATE SPATIAL REFERENCE IF NOT EXISTS –** Specifying CREATE SPATIAL REFERENCE IF NOT EXISTS checks to see if a spatial reference system by that name already exists. If it does not exist, the database server creates the spatial reference system. If it does exist, no further action is performed and no error is returned.
- **IDENTIFIED BY clause –** Use this clause to specify the SRID (*srs-id*) for the spatial reference system. If the spatial reference system is defined by an organization with an *organization-srs-id*, then *srs-id* should be set to that value.

  If the IDENTIFIED BY clause is not specified, then the SRID defaults to the *organization-srs-id* defined by either the ORGANIZATION clause or the DEFINITION clause. If

neither clause defines an *organization-srs-id* that could be used as a default SRID, an error is returned.

When the spatial reference system is based on a well known coordinate system, but has a different geodesic interpretation, set the srs-id value to be 1000000000 (one billion) plus the well known value. For example, the SRID for a planar interpretation of the geodetic spatial reference system WGS 84 (ID 4326) would be 1000004326.

With the exception of SRID 0, spatial reference systems provided by SAP Sybase IQ that are not based on well known systems are given a SRID of 2000000000 (two billion) and above. The range of SRID values from 2000000000 to 2147483647 is reserved by SAP Sybase IQ and you should not create SRIDs in this range.

To reduce the possibility of choosing a SRID that is reserved by a defining authority such as OGC or by other vendors, you should not choose a SRID in the range 0 - 32767 (reserved by EPSG), or in the range 2147483547 - 2147483647.

Also, since the SRID is stored as a signed 32-bit integer, the number cannot exceed 231-1 or 2147483647.

- **DEFINITION clause –** Use this clause to set, or override, default coordinate system settings. If any attribute is set in a clause other than the DEFINITION clause, it takes the value specified in the other clause regardless of what is specified in the DEFINITION clause.

  definition-string is a string in the Spatial Reference System Well Known Text syntax as defined by SQL/MM and OGC. For example, the following query returns the definition for WGS 84.

  ```
  SELECT ST_SpatialRefSys::ST_FormatWKT( definition )
      FROM ST_SPATIAL_REFERENCE_SYSTEMS
      WHERE srs_id=4326;
  ```

  In Interactive SQL, if you double-click the value returned, an easier to read version of the value appears.

  When the DEFINITION clause is specified, definition-string is parsed and used to choose default values for attributes. For example, definition-string may contain an AUTHORITY element that defines the organization-name and *organization-srs-id*.

  Parameter values in definition-string are overridden by values explicitly set using the SQL statement clauses. For example, if the ORGANIZATION clause is specified, it overrides the value for ORGANIZATION in definition-string.
- **ORGANIZATION clause –** Use this clause to specify information about the organization that created the spatial reference system that the new spatial reference system is based on. organization-name is the name of the organization that created it; *organization-srs-id* is the numeric identifier the organization uses to identify the spatial reference system.
- **TRANSFORM DEFINITION clause –** Use this clause to specify a description of the transform to use for the spatial reference system. Currently, only the PROJ.4 transform is supported.

For example, the transform-definition-string for WGS 84 is '+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs'.

If you specify an unsupported transform definition, an error is returned.

The transform definition is used by the ST_Transform method when transforming data between spatial reference systems. Some transforms may still be possible even if there is no transform-definition-string defined.

- **LINEAR UNIT OF MEASURE clause –** Use this clause to specify the linear unit of measure for the spatial reference system. The value you specify must match a linear unit of measure that is defined in the ST_UNITS_OF_MEASURE system view.

  If this clause is not specified, and is not defined in the DEFINITION clause, the default is METRE.

  To add predefined units of measure to the database, use the sa_install_feature system procedure.

  To add custom units of measure to the database, use the CREATE SPATIAL UNIT OF MEASURE statement.

  Note: While both METRE and METER are accepted spellings, METRE is preferred as it conforms to the SQL/MM standard.

- **ANGULAR UNIT OF MEASURE clause –** Use this clause to specify the angular unit of measure for the spatial reference system. The value you specify must match an angular unit of measure defined in the ST_UNITS_OF_MEASURE system table.

  If this clause is not specified, and is not defined in the DEFINITION clause, the default is DEGREE for geographic spatial reference systems and NULL for non-geographic spatial reference systems.

  The angular unit of measure must be non-NULL for geographic spatial reference systems and it must be NULL for non-geographic spatial reference systems.

  To add predefined units of measure to the database, use the sa_install_feature system procedure.

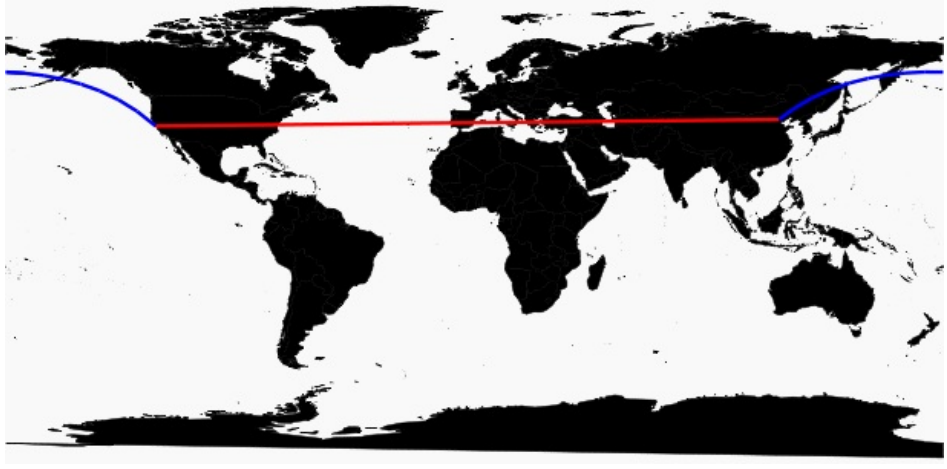
  To add custom units of measure to the database, use the CREATE SPATIAL UNIT OF MEASURE statement.

- **TYPE clause –** Use the TYPE clause to control how the SRS interprets lines between points. For geographic spatial reference systems, the TYPE clause can specify either ROUND EARTH (the default) or PLANAR. The ROUND EARTH model interprets lines between points as great elliptic arcs. Given two points on the surface of the Earth, a plane is selected that intersects the two points and the center of the Earth. This plane intersects the Earth, and the line between the two points is the shortest distance along this intersection.

  For two points that lie directly opposite each other, there is not a single unique plane that intersects the two points and the center of the Earth. Line segments connecting these anti-podal points are not valid and give an error in the ROUND EARTH model.

The ROUND EARTH model treats the Earth as a spheroid and selects lines that follow the curvature of the Earth. In some cases, it may be necessary to use a planar model where a line between two points is interpreted as a straight line in the equirectangular projection where x=long, y=lat.

In the following example, the blue line shows the line interpretation used in the ROUND EARTH model and the red line shows the corresponding PLANAR model.



The PLANAR model may be used to match the interpretation used by other products. The PLANAR model may also be useful because there are some limitations for methods that are not supported in the ROUND EARTH model (such as ST_Area, ST_ConvexHull) and some are partially supported (ST_Distance only supported between point geometries). Geometries based on circularstrings are not supported in ROUND EARTH spatial reference systems.

For non-geographic SRSs, the type must be PLANAR (and that is the default if the TYPE clause is not specified and either the DEFINITION clause is not specified or it uses a non-geographic definition).

- **COORDINATE clause –** Use this clause to specify the bounds on the spatial reference system's dimensions. coordinate-name is the name of the coordinate system used by the spatial reference system. For non-geographic coordinate systems, coordinate-name can be x, y, or m. For geographic coordinate systems, coordinate-name can be LATITUDE, LONGITUDE, z, or m.

  Specify UNBOUNDED to place no bounds on the dimensions. Use the BETWEEN clause to set low and high bounds.

  The X and Y coordinates must have associated bounds. For geographic spatial reference systems, the longitude coordinate is bounded between -180 and 180 degrees and the latitude coordinate is bounded between -90 and 90 degrees by default the unless

COORDINATE clause overrides these settings. For non-geographic spatial reference systems, the CREATE statement must specify bounds for both X and Y coordinates.

LATITUDE and LONGITUDE are used for geographic coordinate systems. The bounds for LATITUDE and LONGITUDE default to the entire Earth, if not specified.

- **ELLIPSOID clause –** Use the ellipsoid clause to specify the values to use for representing the Earth as an ellipsoid for spatial reference systems of type ROUND EARTH. If the DEFINITION clause is present, it can specify ellipsoid definition. If the ELLIPSOID clause is specified, it overrides this default ellipsoid.

  The Earth is not a perfect sphere because the rotation of the Earth causes a flattening so that the distance from the center of the Earth to the North or South pole is less than the distance from the center to the equator. For this reason, the Earth is modeled as an ellipsoid with different values for the semi-major axis (distance from center to equator) and semi-minor axis (distance from center to the pole). It is most common to define an ellipsoid using the semi-major axis and the inverse flattening, but it can instead be specified using the semi-minor axis (for example, this approach must be used when a perfect sphere is used to approximate the Earth). The semi-major and semi-minor axes are defined in the linear units of the spatial reference system, and the inverse flattening (1/f) is a ratio:

  ```
  1/f = (semi-major-axis) / (semi-major-axis - semi-minor-axis)
  ```

  SAP Sybase IQ uses the ellipsoid definition when computing distance in geographic spatial reference systems.

  The ellipsoid must be defined for geographic spatial reference systems (either in the DEFINITION clause or the ELLIPSOID clause), and it must not be specified for non-geographic spatial reference systems.
- **SNAP TO GRID clause –** For flat-Earth (planar) spatial reference systems, use the SNAP TO GRID clause to define the size of the grid SAP Sybase IQ uses when performing calculations. By default, SAP Sybase IQ selects a grid size so that 12 significant digits can be stored at all points in the space bounds for X and Y. For example, if a spatial reference system bounds X between -180 and 180 and Y between -90 and 90, then a grid size of 0.000000001 (1E-9) is selected.

  grid-size must be large enough so that points snapped to the grid can be represented with equal precision at all points in the bounded space. If grid-size is too small, the server reports an error.

  When set to 0, no snapping to grid is performed.

  For round-Earth spatial reference systems, SNAP TO GRID must be set to 0.

  Specify SNAP TO GRID DEFAULT to set the grid size to the default that the database server would use.
- **TOLERANCE clause –** For flat-Earth (planar) spatial reference systems, use the TOLERANCE clause to specify the precision to use when comparing points. If the distance between two points is less than tolerance-distance, the two points are considered equal. Setting tolerance-distance allows you to control the tolerance for imprecision in the

input data or limited internal precision. By default, tolerance-distance is set to be equal to grid-size.

When set to 0, two points must be exactly equal to be considered equal.

For round-Earth spatial reference systems, TOLERANCE must be set to 0.

- **POLYGON FORMAT clause –** Internally, SAP Sybase IQ interprets polygons by looking at the orientation of the constituent rings. As one travels a ring in the order of the defined points, the inside of the polygon is on the left side of the ring. The same rules are applied in PLANAR and ROUND EARTH spatial reference systems.

  The interpretation used by SAP Sybase IQ is a common but not universal interpretation. Some products use the exact opposite orientation, and some products do not rely on ring orientation to interpret polygons. The POLYGON FORMAT clause can be used to select a polygon interpretation that matches the input data, as needed. The following values are supported:

  - **'CounterClockwise'** The input follows SAP Sybase IQ's internal interpretation: the inside of the polygon is on the left side while following ring orientation.
  - **'Clockwise'** The input follows the opposite of SAP Sybase IQ's approach: the inside of the polygon is on the right side while following ring orientation.
  - **"EvenOdd'** EvenOdd is the default format. With EvenOdd, the orientation of rings is ignored and the inside of the polygon is instead determined by looking at the nesting of the rings, with the exterior ring being the largest ring and interior rings being smaller rings inside this ring. A ray is traced from a point within the rings and radiating outward crossing all rings. If the number the ring being crossed is an even number, it is an outer ring. If it is odd, it is an inner ring.
- **STORAGE FORMAT clause –** When you insert spatial data into the database from an external format (such as WKT or WKB), the database server normalizes the data to improve the performance and semantics of spatial operations. The normalized representation may differ from the original representation (for example, in the orientation of polygon rings or the precision stored in individual coordinates). While spatial equality is maintained after the normalization, some original input characteristics may not be reproducible, such as precision and ring orientation. In some cases you may want to store the original representation, either exclusively, or in addition to the normalized representation.

  To control what is stored, specify the STORAGE FORMAT clause followed by one of the following values:

  - **'Internal'** SAP Sybase IQ stores only the normalized representation. Specify this value when the original input characteristics do not need to be reproduced. This is the default for planar spatial reference systems (TYPE PLANAR).
  - **'Original'** SAP Sybase IQ stores only the original representation. The original input characteristics can be reproduced, but all operations on the stored values must repeat normalization steps, possibly slowing down operations on the data.

- **'Mixed'** SAP Sybase IQ stores the internal version and, if it is different from the original version, it stores the original version as well. By storing both versions, the original representation characteristics can be reproduced and operations on stored values do not need to repeat normalization steps. However, storage requirements may increase significantly because potentially two representations are being stored for each geometry. Mixed is the default format for round-Earth spatial reference systems (TYPE ROUND EARTH).

Examples

- **Example –** The following example creates a spatial reference system named mySpatialRS:

```
CREATE SPATIAL REFERENCE SYSTEM "mySpatialRS"
IDENTIFIED BY 1000026980
LINEAR UNIT OF MEASURE "metre"
TYPE PLANAR
COORDINATE X BETWEEN 171266.736269555 AND 831044.757769222
COORDINATE Y BETWEEN 524881.608973277 AND 691571.125115319
DEFINITION 'PROJCS["NAD83 / Kentucky South",
GEOGCS["NAD83",
DATUM["North_American_Datum_1983",
SPHEROID["GRS 1980",
6378137,298.257222101,AUTHORITY["EPSG","7019"]],
AUTHORITY["EPSG","6269"]],
PRIMEM["Greenwich",0,AUTHORITY["EPSG","8901"]],
UNIT["degree",0.01745329251994328,AUTHORITY["EPSG","9122"]],
AUTHORITY["EPSG","4269"]],
UNIT["metre",1,AUTHORITY["EPSG","9001"]],
PROJECTION["Lambert_Conformal_Conic_2SP"],
PARAMETER["standard_parallel_1",37.93333333333333],
PARAMETER["standard_parallel_2",36.73333333333333],
PARAMETER["latitude_of_origin",36.33333333333334],
PARAMETER["central_meridian",-85.75],
PARAMETER["false_easting",500000],
PARAMETER["false_northing",500000],
AUTHORITY["EPSG","26980"],
AXIS["X",EAST],
AXIS["Y",NORTH]]'
TRANSFORM DEFINITION '+proj=lcc
+lat_1=37.93333333333333+lat_2=36.73333333333333+lat_0=36.3333333
3333334+lon_0=-85.75+x_0=500000+y_0=500000+ellps=GRS80+datum=NAD8
3+units=m+no_defs';
```

Usage

For a geographic spatial reference system, you can specify both a LINEAR and an ANGULAR unit of measure; otherwise for non-geographic, you specify only a LINEAR unit of measure. The LINEAR unit of measure is used for computing distance between points and areas. The ANGULAR unit of measure tells how the angular latitude/longitude are interpreted and is NULL for projected coordinate systems, non-NULL for geographic coordinate systems.

All derived geometries returned by operations are normalized.

When working with data that is being synchronized with a non-SQL Anywhere database, STORAGE FORMAT should be set to either 'Original' or 'Mixed' so that the original characteristics of the data can be preserved.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- MANAGE ANY SPATIAL OBJECT system privilege.
- CREATE ANY OBJECT system privilege.

CREATE SPATIAL UNIT OF MEASURE Statement

Creates or replaces a spatial unit of measurement.

Syntax

```
CREATE [ OR REPLACE ] SPATIAL UNIT OF MEASURE identifier
    TYPE { LINEAR | ANGULAR }
    [ CONVERT USING number ]
```

Parameters

- **OR REPLACE clause –** Including the OR REPLACE creates a new spatial unit of measure, or replaces an existing spatial unit of measure with the same name. This clause preserves existing privileges. An error is returned if you attempt to replace a spatial unit that is already in use.
- **TYPE clause –** Defines whether the unit of measure is used for angles (ANGULAR) or distances (LINEAR).
- **CONVERT USING –** The conversion factor for the spatial unit relative to the base unit. For linear units, the base unit is METRE. For angular units, the base unit is RADIAN.

Examples

- **Example –** The following example creates a spatial unit of measure named Test.

```
CREATE SPATIAL UNIT OF MEASURE Test
TYPE LINEAR
CONVERT USING 15;
```

Usage

The CONVERT USING clause is used to define how to convert a measurement in the defined unit of measure to the base unit of measure (radians or meters). The measurement is multiplied

by the supplied conversion factor to get a value in the base unit of measure. For example, a measurement of 512 millimeters would be multiplied by a conversion factor of 0.001 to get a measurement of 0.512 metres.

Spatial reference systems always include a linear unit of measure to be used when calculating distances (ST_Distance or ST_Length), or area. For example, if the linear unit of measure for a spatial reference system is miles, then the area unit used is square miles. In some cases, spatial methods accept an optional parameter that specifies the linear unit of measure to use. For example, if the linear unit of measure for a spatial reference system is in miles, you could retrieve the distance between two geometries in meters by using the optional parameter 'metre'.

For projected coordinate systems, the X and Y coordinates are specified in the linear unit of the spatial reference system. For geographic coordinate systems, the latitude and longitude are specified in the angular units of measure associated with the spatial reference system. In many cases, this angular unit of measure is degrees but any valid angular unit of measure can be used.

You can use the sa_install_feature system procedure to add predefined units of measure to your database.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- MANAGE ANY SPATIAL OBJECT system privilege.
- CREATE ANY OBJECT system privilege.

CREATE TABLE Statement

Creates a new table in the database or on a remote server.

Syntax

```
CREATE [ { GLOBAL | LOCAL } TEMPORARY ] TABLE
  [ IF NOT EXISTS ] [ owner. ]table-name
… ( column-definition [ column-constraint ] …
[ , column-definition [ column-constraint ] …]
[ , table-constraint ] … )
|{ ENABLE | DISABLE } RLV STORE
|[WITH NULLS NOT DISTINCT]
…[ IN dbspace-name ]
…[ ON COMMIT { DELETE | PRESERVE } ROWS
| NOT TRANSACTIONAL ]
[ AT location-string ]
[PARTITION BY
```

```
  range-partitioning-scheme
  | hash-partitioning-scheme
  | composite-partitioning-scheme ]
```

Parameters

- **column-definition –**

```
column-name data-type
    [ [ NOT ] NULL ]
    [ DEFAULT default-value | IDENTITY ]
    [ PARTITION | SUBPARTITION ( partition-name IN  dbspace-name
[ , ... ] ) ]
```

- **default-value –**

```
special-value
   | string
   | global variable
   | [ - ] number
   | ( constant-expression )
   | built-in-function( constant-expression )
   | AUTOINCREMENT
   | CURRENT DATABASE
   | CURRENT REMOTE USER
   | NULL
   | TIMESTAMP
   | LAST USER
```

- **special-value –**

```
CURRENT
  { DATE
    | TIME
    | TIMESTAMP
    | USER
    | PUBLISHER }
    | USER
```

- **column-constraint –**

```
[ CONSTRAINT constraint-name ] {
     { UNIQUE
        | PRIMARY KEY
        | REFERENCES table-name [ ( column-name ) ] [ action ]
      }
      [ IN dbspace-name ]
      | CHECK ( condition )
      | IQ UNIQUE ( integer )
    }
```

- **table-constraint –**

```
[ CONSTRAINT constraint-name ]
  {
    { UNIQUE ( column-name [ , column-name ] … )
      | PRIMARY KEY ( column-name [ , column-name ] … )
     }
    [ IN dbspace-name ]
```

```
      | foreign-key-constraint
      | CHECK ( condition )
      | IQ UNIQUE ( integer )
   }
```

- **foreign-key-constraint –**

```
FOREIGN KEY [ role-name ] [ ( column-name [ , column-name ] … ) ]
   …REFERENCES table-name [ ( column-name [ , column-name ] … ) ]
   …[ actions ] [ IN dbspace-name ]
```

- **actions –**

```
[ ON { UPDATE | DELETE } RESTRICT ]
```

- **location-string –**

```
{ remote-server-name. [ db-name ].[ owner ].object-name
      | remote-server-name; [ db-name ];[ owner ];object-name }
```

- **Partitioning-scheme –**

```
{ range-partitioning-scheme
      | hash-partitioning-scheme
      | composite-partitioning-scheme
    }
```

- **range-partitioning-scheme –**

```
RANGE( partition-key ) ( range-partition-decl [,range-partition-
decl ... ] )
```

- **partition-key –**

```
column-name
```

- **range-partition-decl –**

```
   VALUES <= ( {constant-expr |  MAX } [ , { constant-expr |
MAX }]... )
    [ IN dbspace-name ]
```

- **hash-partitioning-scheme –**

```
HASH  ( partition-key [ , partition-key, … ] )
```

- **composite-partitioning-scheme –**

```
hash-partitioning-scheme  SUBPARTITION  range-partitioning-scheme
```

Examples

- **Example 1 –** Create a table named `SalesOrders2` with five columns. Data pages for columns `FinancialCode`, `OrderDate`, and `ID` are in dbspace `Dsp3`. Data pages for integer column `CustomerID` are in dbspace `Dsp1`. Data pages for CLOB column `History` are in dbspace `Dsp2`. Data pages for the primary key, HG for `ID`, are in dbspace `Dsp4`:

```
CREATE TABLE SalesOrders2 (
FinancialCode CHAR(2),
```

```
CustomerID int IN Dsp1,
History CLOB IN Dsp2,
OrderDate TIMESTAMP,
ID BIGINT,
PRIMARY KEY(ID) IN Dsp4
) IN Dsp3
```

- **Example 2 –** Create a table `fin_code2` with four columns. Data pages for columns `code`, `type`, and `id` are in the default dbspace, which is determined by the value of the database option `DEFAULT_DBSPACE`. Data pages for `CLOB` column `description` are in dbspace `Dsp2`. Data pages from foreign key fk1, HG for c1 are in dbspace `Dsp4`:

```
CREATE TABLE fin_code2 (
code INT,
type CHAR(10),
description CLOB IN Dsp2,
id BIGINT,
FOREIGN KEY fk1(id) REFERENCES SalesOrders(ID) IN Dsp4
)
```

- **Example 3 –** Create a table `t1` where partition `p1` is adjacent to `p2` and partition `p2` is adjacent to `p3`:

```
CREATE TABLE t1 (c1 INT, c2 INT)
PARTITION BY RANGE(c1)
(p1 VALUES <= (0), p2 VALUES <= (10), p3 VALUES <= (100))
```

- **Example 4 –** Create a RANGE partitioned table `bar` with six columns and three partitions, mapping data to partitions based on dates:

```
CREATE TABLE bar (
        c1 INT IQ UNIQUE(65500),
        c2 VARCHAR(20),
        c3 CLOB PARTITION (P1 IN Dsp11, P2 IN Dsp12,
           P3 IN Dsp13),
        c4 DATE,
        c5 BIGINT,
        c6 VARCHAR(500) PARTITION (P1 IN Dsp21,
           P2 IN Dsp22),
        PRIMARY KEY (c5) IN Dsp2) IN Dsp1
        PARTITION BY RANGE (c4)
        (P1 VALUES <= ('2006/03/31') IN Dsp31,
         P2 VALUES <= ('2006/06/30') IN Dsp32,
         P3 VALUES <= ('2006/09/30') IN Dsp33
        ) ;
```

Data page allocation for each partition:

Partition	Dbspaces	Columns
P1	Dsp31	c1, c2, c4, c5
P1	Dsp11	c3

Partition	Dbspaces	Columns
P1	Dsp21	c6
P2	Dsp32	c1, c2, c4, c5
P2	Dsp12	c3
P2	Dsp22	c6
P3	Dsp33	c1, c2, c4, c5, c6
P3	Dsp13	c3
P1, P2, P3	Dsp1	lookup store of c1 and other shared data
P1, P2, P3	Dsp2	primary key (HG for c5)

- **Example 5 –** Create a `HASH` partitioned (`table tbl42`) that includes a `PRIMARY KEY` (column c1) and a `HASH PARTITION KEY` (columns c4 and c3).

```
CREATE TABLE tbl42 (
    c1 BIGINT NOT NULL,
    c2 CHAR(2) IQ UNIQUE(50),
    c3 DATE IQ UNIQUE(36524),
    c4 VARCHAR(200),
  PRIMARY KEY (c1)
    )
  PARTITION BY HASH ( c4, c3 )
```

- **Example 6 –** Create a hash-ranged partitioned table with a `PRIMARY KEY` (column c1), a hash partition key (columns c4 and c2) and a range subpartition key (column c3).

```
CREATE TABLE tbl42 (
    c1 BIGINT NOT NULL,
    c2 CHAR(2) IQ UNIQUE(50),
    c3 DATE,
    c4 VARCHAR(200),
  PRIMARY KEY (c1)) IN Dsp1

  PARTITION BY HASH ( c4, c2 )
  SUBPARTITION BY RANGE ( c3 )
  ( P1 VALUES <= (2011/03/31) IN Dsp31,
    P2 VALUES <= (2011/06/30) IN Dsp32,
    P3 VALUES <= (2011/09/30) IN Dsp33) ;
```

- **Example 7 –** Create a table for a library database to hold information on borrowed books:

```
CREATE TABLE borrowed_book (
date_borrowed DATE NOT NULL,
date_returned DATE,
book       CHAR(20)
           REFERENCES library_books (isbn),
```

```
CHECK( date_returned >= date_borrowed )
)
```

- **Example 8 –** Create table `t1` at the remote server `SERVER_A` and create a proxy table named `t1` that is mapped to the remote table:

```
CREATE TABLE t1
( a  INT,
  b  CHAR(10))
AT 'SERVER_A.db1.joe.t1'
```

- **Example 9 –** Create table `tab1` that contains a column `c1` with a default value of the special constant `LAST USER`:

```
CREATE TABLE tab1(c1 CHAR(20) DEFAULT LAST USER)
```

- **Example 10 –** Create a local temporary table `tab1` that contains a column `c1`:

```
CREATE LOCAL TEMPORARY TABLE tab1(c1 int) IN IQ_SYSTEM_TEMP
```

  The example creates `tab1` in the IQ_SYSTEM_TEMP dbspace in the following cases:

  - `DQP_ENABLED` logical server policy option is set ON but there are no read-write files in IQ_SHARED_TEMP
  - `DQP_ENABLED` option is OFF, `TEMP_DATA_IN_SHARED_TEMP` logical server policy option is ON, but there are no read-write files in IQ_SHARED_TEMP
  - Both the `DQP_ENABLED` option and the `TEMP_DATA_IN_SHARED_TEMP` option are set OFF

  The example creates the same table `tab1` in the IQ_SHARED_TEMP dbspace in the following cases:

  - `DQP_ENABLED` is ON and there are read-write files in IQ_SHARED_TEMP
  - `DQP_ENABLED` is OFF, `TEMP_DATA_IN_SHARED_TEMP` is ON, and there are read-write files in IQ_SHARED_TEMP

- **Example 11 –** Create a table `tab1` that is enabled to use row-level versioning, and real-time storage in the in-memory RLV store.

```
CREATE TABLE tab1 ( c1 INT, c2 CHAR(25) ) ENABLE RLV STORE
```

Usage

You can create a table for another user by specifying an owner name. If `GLOBAL TEMPORARY` or `LOCAL TEMPORARY` is not specified, the table is referred to as a base table. Otherwise, the table is a temporary table.

A created global temporary table exists in the database like a base table and remains in the database until it is explicitly removed by a `DROP TABLE` statement. The rows in a temporary table are visible only to the connection that inserted the rows. Multiple connections from the same or different applications can use the same temporary table at the same time and each connection sees only its own rows. A given connection inherits the schema of a global

temporary table as it exists when the connection first refers to the table. The rows of a temporary table are deleted when the connection ends.

When you create a local temporary table, omit the owner specification. If you specify an owner when creating a temporary table, for example, `CREATE TABLE dbo.#temp(col1 int)`, a base table is incorrectly created.

An attempt to create a base table or a global temporary table will fail, if a local temporary table of the same name exists on that connection, as the new table cannot be uniquely identified by `owner.table`.

You can, however, create a local temporary table with the same name as an existing base table or global temporary table. References to the table name access the local temporary table, as local temporary tables are resolved first.

For example, consider this sequence:

```
CREATE TABLE t1 (c1 int);
INSERT t1 VALUES (9);

CREATE LOCAL TEMPORARY TABLE t1 (c1 int);
INSERT t1 VALUES (8);

SELECT * FROM t1;
```

The result returned is 8. Any reference to `t1` refers to the local temporary table `t1` until the local temporary table is dropped by the connection.

In a procedure, use the `CREATE LOCAL TEMPORARY TABLE` statement, instead of the `DECLARE LOCAL TEMPORARY TABLE` statement, when you want to create a table that persists after the procedure completes. Local temporary tables created using the `CREATE LOCAL TEMPORARY TABLE` statement remain until they are either explicitly dropped, or until the connection closes.

Local temporary tables created in `IF` statements using `CREATE LOCAL TEMPORARY TABLE` also persist after the `IF` statement completes.

SAP Sybase IQ does not support the `CREATE TABLE ENCRYPTED` clause for table-level encryption of SAP Sybase IQ tables. However, the `CREATE TABLE ENCRYPTED` clause is supported for SQL Anywhere tables in an SAP Sybase IQ database.

IF NOT EXISTS — If the named object already exists, no changes are made and an error is not returned.

{ ENABLE | DISABLE } RLV STORE — Registers this table with the RLV store for real-time in-memory updates. This value overrides the value of the database option **BASE_TABLES_IN_RLV**. Requires the CREATE TABLE system privilege and CREATE permissions on the RLV store dbspace to set this value to **ENABLE**.

Note: The { ENABLE | DISABLE } RLV STORE clause is not supported for IQ temporary tables.

WITH NULLS NOT DISTINCT clause can only be specified if you are declaring the index to be UNIQUE and allows you to specify that NULLs in index keys are not unique. See the UNIQUE clause for more information.

IN — Specifies in which database file (dbspace) the table is to be created. Specify SYSTEM with this clause to put either a permanent or temporary table in the catalog store. Specify IQ_SYSTEM_TEMP to store temporary user objects (tables, partitions, or table indexes) in IQ_SYSTEM_TEMP or, if the TEMP_DATA_IN_SHARED_TEMP option is set 'ON', and the IQ_SHARED_TEMP dbspace contains RW files, in IQ_SHARED_TEMP. (You cannot specify the IN clause with IQ_SHARED_TEMP.) All other use of the IN clause is ignored. By default, all permanent tables are placed in the main IQ store, and all temporary tables are placed in the temporary IQ store. Global temporary and local temporary tables can never be in the IQ store.

The following syntax is unsupported:

```
CREATE LOCAL TEMPORARY TABLE tab1(c1 int) IN IQ_SHARED_TEMP
```

The IN clause in the *column-definition*, *column-constraint*, *table-constraint*, and *foreign-key* clauses specify the dbspace where the object is to be created. If the IN clause is omitted, SAP Sybase IQ creates the object in the dbspace where the table is assigned.

For more information about dbspaces, see *CREATE DBSPACE Statement* .

ON COMMIT — Allowed for temporary tables only. By default, the rows of a temporary table are deleted on COMMIT.

NOT TRANSACTIONAL — Allowed only for temporary tables. A table created using NOT TRANSACTIONAL is not affected by either COMMIT or ROLLBACK.

Note: The NOT TRANSACTIONAL clause is not supported for IQ temporary tables.

The NOT TRANSACTIONAL clause provides performance improvements in some circumstances because operations on nontransactional temporary tables do not cause entries to be made in the rollback log. For example, NOT TRANSACTIONAL might be useful if procedures that use the temporary table are called repeatedly with no intervening COMMIT or ROLLBACK statements.

The parenthesized list following the CREATE TABLE statement can contain these clauses in any order:

AT — Used to create a table at the remote location specified by *location-string*. The local table that is created is a proxy table that maps to the remote location. Tables used as proxy tables must have names of 30 characters or less. The AT clause supports the semicolon (;) as a delimiter. If a semicolon is present anywhere in the *location-string*, the semicolon is the field delimiter. If no semicolon is present, a period is the field delimiter. This allows file names and extensions to be used in the database and owner fields.

Semicolon field delimiters are used primarily with server classes not currently supported; however, you can also use them in situations where a period would also work as a field delimiter. For example, this statement maps the table `proxy_a` to the SQL Anywhere database `mydb` on the remote server `myasa`:

```
CREATE TABLE proxy_a1
AT 'myasa;mydb;;a1'
```

Foreign-key definitions are ignored on remote tables. Foreign-key definitions on local tables that refer to remote tables are also ignored. Primary key definitions are sent to the remote server if the server supports primary keys.

In a simplex environment, you cannot create a proxy table that refers to a remote table on the same node. In a multiplex environment, you cannot create a proxy table that refers to the remote table defined within the multiplex.

For example, in a simplex environment, if you try to create proxy table `proxy_e` which refers to base table `Employees` defined on the same node, the `CREATE TABLE ... AT` statement is rejected with an error message. In a multiplex environment, the `CREATE TABLE .... AT` statement is rejected if you create proxy table `proxy_e` from any node (coordinator or secondary) that refers to remote table `Employees` defined within a multiplex.

column-definition — Defines a column in the table. Allowable data types are described in *Reference: Building Blocks, Tables, and Procedures > SQL Data Types*. Two columns in the same table cannot have the same name. If NOT NULL is specified, or if the column is in a `UNIQUE` or `PRIMARY KEY` constraint, the column cannot contain any NULL values. You can create up to 45,000 columns; however, there might be performance penalties with more than 10,000 columns in a table. The limit on the number of columns per table that allow NULLs is approximately 8*(database-page-size - 30).

- **DEFAULT default-value**—When defining a column for a table, you can specify a default value for the column using the DEFAULT keyword in the `CREATE TABLE` (and `ALTER TABLE`) statement. If a DEFAULT value is specified for a column, this DEFAULT value is used as the value of the column in any `INSERT` (or `LOAD`) statement that does not specify a value for the column.
- **DEFAULT AUTOINCREMENT** — The value of the `DEFAULT AUTOINCREMENT` column uniquely identifies every row in a table. Columns of this type are also known as `IDENTITY` columns, for compatibility with Adaptive Server Enterprise. The `IDENTITY/DEFAULT AUTOINCREMENT` column stores sequential numbers that are automatically generated during inserts and updates. When using `IDENTITY` or `DEFAULT AUTOINCREMENT`, the column must be one of the integer data types, or an exact numeric type, with scale 0. The column value might also be `NULL`. You must qualify the specified table name with the owner name.
  `ON` inserts into the table. If a value is not specified for the `IDENTITY/DEFAULT AUTOINCREMENT` column, a unique value larger than any other value in the column is generated. If an `INSERT` specifies a value for the column, it is used; if the specified value

is not larger than the current maximum value for the column, that value is used as a starting point for subsequent inserts.

Deleting rows does not decrement the IDENTITY/AUTOINCREMENT counter. Gaps created by deleting rows can only be filled by explicit assignment when using an insert. The database option IDENTITY_INSERT must be set to the table name to perform an insert into an IDENTITY/AUTOINCREMENT column.

For example, this creates a table with an IDENTITY column and explicitly adds some data to it:

```
CREATE TABLE mytable(c1 INT IDENTITY);
SET TEMPORARY OPTION IDENTITY_INSERT = "DBA".mytable;
INSERT INTO mytable VALUES(5);
```

After an explicit insert of a row number less than the maximum, subsequent rows without explicit assignment are still automatically incremented with a value of one greater than the previous maximum.

You can find the most recently inserted value of the column by inspecting the @@identity global variable.

- **IDENTITY** — A Transact-SQL-compatible alternative to using the AUTOINCREMENT default. In SAP Sybase IQ, the identity column may be created using either the IDENTITY or the DEFAULT AUTOINCREMENT clause.

table-constraint — Helps ensure the integrity of data in the database. There are four types of integrity constraints:

- **UNIQUE** constraint — Identifies one or more columns that uniquely identify each row in the table. No two rows in the table can have the same values in all the named columns. A table may have more than one unique constraint.
- **PRIMARY KEY** constraint—Is the same as a UNIQUE constraint except that a table can have only one primary-key constraint. You cannot specify the PRIMARY KEY and UNIQUE constraints for the same column. The primary key usually identifies the best identifier for a row. For example, the customer number might be the primary key for the customer table.
- **FOREIGN KEY** constraint — Restricts the values for a set of columns to match the values in a primary key or uniqueness constraint of another table. For example, a foreign-key constraint could be used to ensure that a customer number in an invoice table corresponds to a customer number in the customer table.

  Note: You cannot create foreign-key constraints on local temporary tables. Global temporary tables must be created with ON COMMIT PRESERVE ROWS.
- **CHECK** constraint — Allows arbitrary conditions to be verified. For example, a check constraint could be used to ensure that a column called Gender contains only the values male or female. No row in a table is allowed to violate a constraint. If an INSERT or UPDATE statement would cause a row to violate a constraint, the operation is not permitted and the effects of the statement are undone.

Column identifiers in column check constraints that start with the symbol '@' are placeholders for the actual column name. A statement of the form:

```
CREATE TABLE t1(c1 INTEGER CHECK (@foo < 5))
```

is exactly the same as this statement:

```
CREATE TABLE t1(c1 INTEGER CHECK (c1 < 5))
```

Column identifiers appearing in table check constraints that start with the symbol '@'are not placeholders.

If a statement would cause changes to the database that violate an integrity constraint, the statement is effectively not executed and an error is reported. (Effectively means that any changes made by the statement before the error was detected are undone.)

SAP Sybase IQ enforces single-column `UNIQUE` constraints by creating an `HG` index for that column.

Note: You cannot define a column with a `BIT` data type as a `UNIQUE` or `PRIMARY KEY` constraint. Also, the default for columns of `BIT` data type is to not allow `NULL` values; you can change this by explicitly defining the column as allowing `NULL` values.

---

column-constraint — Restricts the values the column can hold. Column and table constraints help ensure the integrity of data in the database. If a statement would cause a violation of a constraint, execution of the statement does not complete, any changes made by the statement before error detection are undone, and an error is reported. Column constraints are abbreviations for the corresponding table constraints. For example, these are equivalent:

```
CREATE TABLE Products (
    product_num integer UNIQUE
)
CREATE TABLE Products (
    product_num integer,
    UNIQUE ( product_num )
)
```

Column constraints are normally used unless the constraint references more than one column in the table. In these cases, a table constraint must be used.

IQ UNIQUE constraint — Defines the expected cardinality of a column and determines whether the column loads as `Flat FP` or `NBit FP`. An `IQ UNIQUE(`*n*`)` value explicitly set to 0 loads the column as `Flat FP`. Columns without an `IQ UNIQUE` constraint implicitly load as `NBit` up to the limits defined by the `FP_NBIT_AUTOSIZE_LIMIT`, `FP_NBIT_LOOKUP_MB`, and `FP_NBIT_ROLLOVER_MAX_MB` options:

- `FP_NBIT_AUTOSIZE_LIMIT` limits the number of distinct values that load as `NBit`
- `FP_NBIT_LOOKUP_MB` sets a threshold for the total `NBit` dictionary size
- `FP_NBIT_ROLLOVER_MAX_MB` sets the dictionary size for implicit `NBit` rollovers from `NBit` to `Flat FP`

- FP_NBIT_ENFORCE_LIMITS enforces NBit dictionary sizing limits. This option is OFF by default

Using IQ UNIQUE with an *n* value less than the FP_NBIT_AUTOSIZE_LIMIT is not necessary. Auto-size functionality automatically sizes all low or medium cardinality columns as NBit. Use IQ UNIQUE in cases where you want to load the column as Flat FP or when you want to load a column as NBit when the number of distinct values exceeds the FP_NBIT_AUTOSIZE_LIMIT.

Note:

- Consider memory usage when specifying high IQ UNIQUE values. If machine resources are limited, avoid loads with FP_NBIT_ENFORCE_LIMITS='OFF' (default). Prior to SAP Sybase IQ 16.0, an IQ UNIQUE *n* value > 16777216 would rollover to Flat FP. In 16.0, larger IQ UNIQUE values are supported for tokenization, but may require significant memory resource requirements depending on cardinality and column width.
- BIT, BLOB,and CLOB data types do not support NBit dictionary compression. If FP_NBIT_IQ15_COMPATIBILITY='OFF', a non-zero IQ UNIQUE column specification in a CREATE TABLE or ALTER TABLE statement that includes these data types returns an error.

Integrity Constraints

UNIQUE or **UNIQUE** (*column-name*, …)—No two rows in the table can have the same values in all the named columns. A table may have more than one unique constraint.

There is a difference between a *unique constraint* and a *unique index*. Columns of a unique index are allowed to be NULL, while columns in a unique constraint are not. A foreign key can reference either a primary key or a column with a unique constraint, but not a unique index, because it can include multiple instances of NULL.

PRIMARY KEY or **PRIMARY KEY** (*column-name*, …) — The primary key for the table consists of the listed columns, and none of the named columns can contain any NULL values. SAP Sybase IQ ensures that each row in the table has a unique primary key value. A table can have only one PRIMARY KEY.

When the second form is used (PRIMARY KEY followed by a list of columns), the primary key is created including the columns in the order in which they are defined, not the order in which they are listed.

When a column is designated as PRIMARY KEY, FOREIGN KEY, or UNIQUE, SAP Sybase IQ creates a High_Group index for it automatically. For multicolumn primary keys, this index is on the primary key, not the individual columns. For best performance, you should also index each column with a HG or LF index separately.

REFERENCES *primary-table-name* [(*primary-column-name*)] — Defines the column as a foreign key for a primary key or a unique constraint of a primary table. Normally, a foreign key would be for a primary key rather than an unique constraint. If a primary column name is

specified, it must match a column in the primary table which is subject to a unique constraint or primary key constraint, and that constraint must consist of only that one column. Otherwise the foreign key references the primary key of the second table. Primary key and foreign key must have the same data type and the same precision, scale, and sign. Only a non unique single-column `HG` index is created for a single-column foreign key. For a multicolumn foreign key, SAP Sybase IQ creates a non unique composite `HG` index. The maximum width of a multicolumn composite key for a unique or non unique `HG` index is 1KB.

A temporary table cannot have a foreign key that references a base table and a base table cannot have a foreign key that references a temporary table. Local temporary tables cannot have or be referenced by a foreign key.

FOREIGN KEY [*role-name*] [(...)] **REFERENCES** *primary-table-name* [(...)] — Defines foreign-key references to a primary key or a unique constraint in another table. Normally, a foreign key would be for a primary key rather than an unique constraint. (In this description, this other table is called the primary table.)

If the primary table column names are not specified, the primary table columns are the columns in the table's primary key. If foreign key column names are not specified, the foreign-key columns have the same names as the columns in the primary table. If foreign-key column names are specified, then the primary key column names must be specified, and the column names are paired according to position in the lists.

If the primary table is not the same as the foreign-key table, either the unique or primary key constraint must have been defined on the referenced key. Both referenced key and foreign key must have the same number of columns, of identical data type with the same sign, precision, and scale.

The value of the row's foreign key must appear as a candidate key value in one of the primary table's rows unless one or more of the columns in the foreign key contains nulls in a null allows foreign key column.

Any foreign-key column not explicitly defined is automatically created with the same data type as the corresponding column in the primary table. These automatically created columns cannot be part of the primary key of the foreign table. Thus, a column used in both a primary key and foreign key must be explicitly created.

role-name is the name of the foreign key. The main function of *role-name* is to distinguish two foreign keys to the same table. If no *role-name* is specified, the role name is assigned as follows:

1. If there is no foreign key with a *role-name* the same as the table name, the table name is assigned as the *role-name*.
2. If the table name is already taken, the *role-name* is the table name concatenated with a zero-padded 3-digit number unique to the table.

The referential integrity action defines the action to be taken to maintain foreign-key relationships in the database. Whenever a primary key value is changed or deleted from a database table, there may be corresponding foreign key values in other tables that should be

modified in some way. You can specify an ON DELETE clause, followed by the RESTRICT clause:

RESTRICT — Generates an error if you try to update or delete a primary key value while there are corresponding foreign keys elsewhere in the database. Generates an error if you try to update a foreign key so that you create new values unmatched by a candidate key. This is the default action, unless you specify that LOAD optionally reject rows that violate referential integrity. This enforces referential integrity at the statement level.

If you use CHECK ON COMMIT without specifying any actions, then RESTRICT is implied as an action for DELETE. SAP Sybase IQ does not support CHECK ON COMMIT.

A global temporary table cannot have a foreign key that references a base table and a base table cannot have a foreign key that references a global temporary table. Local temporary tables cannot have or be referenced by a foreign key.

CHECK (*condition*) — No row is allowed to fail the condition. If an INSERT statement would cause a row to fail the condition, the operation is not permitted and the effects of the statement are undone.

The change is rejected only if the condition is FALSE; in particular, the change is allowed if the condition is UNKNOWN. CHECK condition is not enforced by SAP Sybase IQ.

Note: If possible, do not define referential integrity foreign key-primary key relationships in SAP Sybase IQ unless you are certain there are no orphan foreign keys.

Remote Tables

Foreign-key definitions are ignored on remote tables. Foreign-key definitions on local tables that refer to remote tables are also ignored. Primary-key definitions are sent to the remote server if the server supports it.

TABLE PARTITIONING

Table partitioning can improve performance by dividing large tables into smaller, more manageable storage objects. Partitions share the same logical attributes of the parent table, but can be placed in separate dbspaces and managed individually. SAP Sybase IQ supports several table partitioning schemes:

- *hash-partitions*
- *range-partitions*
- *composite-partitions*

Note: Range-partitions and composite partitioning schemes, like hash-range partitions, require the separately licensed VLDB Management option.

A *partition-key* is the column or columns that contain the table partitioning keys. Partition keys can contain NULL and DEFAULT values, but cannot contain:

- LOB (BLOB or CLOB) columns

- BINARY, or VARBINARY columns
- CHAR or VARCHAR columns whose length is over 255 bytes
- BIT columns
- FLOAT/DOUBLE/REAL columns

PARTITION BY RANGE — Partitions rows by a range of values in the partitioning column. Range partitioning is restricted to a single partition key column and a maximum of 1024 partitions. In a *range-partitioning-scheme*, the *partition-key* is the column that contains the table partitioning keys:

```
range-partition-decl:
  partition-name VALUES <= ( {constant-expr |  MAX } [ , { constant-
expr |  MAX }]... )
    [ IN dbspace-name ]
```

The *partition-name* is the name of a new partition on which table rows are stored. Partition names must be unique within the set of partitions on a table. The *partition-name* is required.

VALUE clause — Specifies the inclusive upper bound for each partition (in ascending order). The user must specify the partitioning criteria for each range partition to guarantee that each row is distributed to only one partition. NULLs are allowed for the partition column and rows with NULL as partition key value belong to the first table partition. However, NULL cannot be the bound value.

There is no lower bound (MIN value) for the first partition. Rows of NULL cells in the first column of the partition key will go to the first partition. For the last partition, you can either specify an inclusive upper bound or MAX. If the upper bound value for the last partition is not MAX, loading or inserting any row with partition key value larger than the upper bound value of the last partition generates an error.

MAX — Denotes the infinite upper bound and can only be specified for the last partition.

IN — In the *partition-decl*, specifies the dbspace on which rows of the partition should reside.

These restrictions affect partitions keys and bound values for range partitioned tables:

- Partition bounds must be constants, not constant expressions.
- Partition bounds must be in ascending order according to the order in which the partitions were created. That is, the upper bound for the second partition must be higher than for the first partition, and so on.

  In addition, partition bound values must be compatible with the corresponding partition-key column data type. For example, VARCHAR is compatible with CHAR.
- If a bound value has a different data type than that of its corresponding partition key column, SAP Sybase IQ converts the bound value to the data type of the partition key column, with these exceptions:
- Explicit conversions are not allowed. This example attempts an explicit conversion from INT to VARCHAR and generates an error:

  ```
  CREATE TABLE Employees(emp_name VARCHAR(20))
  PARTITION BY RANGE(emp_name)
  ```

```
(p1 VALUES <=(CAST (1 AS VARCHAR(20))),
p2 VALUES <= (CAST (10 AS VARCHAR(20)))
```

- Implicit conversions that result in data loss are not allowed. In this example, the partition bounds are not compatible with the partition key type. Rounding assumptions may lead to data loss and an error is generated:

```
CREATE TABLE emp_id (id INT) PARTITION BY RANGE(id) (p1 VALUES <=
(10.5), p2 VALUES <= (100.5))
```

- In this example, the partition bounds and the partition key data type are compatible. The bound values are directly converted to float values. No rounding is required, and conversion is supported:

```
CREATE TABLE id_emp (id FLOAT)
PARTITION BY RANGE(id) (p1 VALUES <= (10),
p2 VALUES <= (100))
```

- Conversions from non-binary data types to binary data types are not allowed. For example, this conversion is not allowed and returns an error:

```
CREATE TABLE newemp (name BINARY)
PARTITION BY RANGE(name)
(p1 VALUES <= ("Maarten"),
p2 VALUES <= ("Zymmerman")
```

- `NULL` cannot be used as a boundary in a range-partitioned table.
- The row will be in the first partition if the cell value of the 1st column of the partition key evaluated to be `NULL`. SAP Sybase IQ supports only single column partition keys, so any NULL in the partition key distributes the row to the first partition.

PARTITION BY HASH — Hash partitioning maps data to partitions based on partition-key values processed by an internal hashing function. Hash partition keys are restricted to a maximum of eight columns with a combined declared column width of 5300 bytes or less. For hash partitions, the table creator determines only the partition key columns; the number and location of the partitions are determined internally.

In a hash-partitioning declaration, the *partition-key* is a column or group of columns, whose composite value determines the partition where each row of data is stored:

```
hash-partitioning-scheme:
  HASH   ( partition-key [ , partition-key, … ] )
```

Restrictions

- You can only hash partition a base table. Attempting to partitioning a global temporary table or a local temporary table raises an error.
- You cannot add, drop, merge, or split a hash partition.
- You cannot add or drop a column from a hash partition key.

Hash-Range Partitions — Hash-range partitioning is a composite partitioning scheme that subpartitions a hash-partitioned table by range. In a hash-range-partitioning-scheme declaration, a `SUBPARTITION BY RANGE` clause adds a new range subpartition to an existing hash-range partitioned table:

```
hash-range-partitioning-scheme:
PARTITION BY HASH   ( partition-key [ , partition-key, … ] )
```

```
   [ SUBPARTITION BY RANGE  ( range-partition-decl [ , range-partition-
decl ... ] ) ]
```

The hash partition specifies how the data is logically distributed and colocated; the range subpartition specifies how the data is physically placed. The new range subpartition is logically partitioned by hash with the same hash partition keys as the existing hash-range partitioned table. The range subpartition key is restricted to one column.

Side Effects

- Automatic commit

Standards

- SQL—Vendor extension to `ISO/ANSI SQL` grammar.

  These are vendor extensions:
  - The { **IN** | **ON** } *dbspace-name* clause
  - The **ON COMMIT** clause
  - Some of the default values
- Sybase—Supported by Adaptive Server Enterprise, with some differences.
  - Temporary tables— You can create a temporary table by preceding the table name in a **CREATE TABLE** statement with a pound sign (#). These temporary tables are SAP Sybase IQ declared temporary tables, which are available only in the current connection. For information about declared temporary tables, see *DECLARE LOCAL TEMPORARY TABLE Statement*.
  - Physical placement—Physical placement of a table is carried out differently in SAP Sybase IQ and in Adaptive Server Enterprise. The **ON** *segment-name* clause supported by Adaptive Server Enterprise is supported in SAP Sybase IQ, but *segment-name* refers to an IQ dbspace.
  - Constraints—SAP Sybase IQ does not support named constraints or named defaults, but does support user-defined data types that allow constraint and default definitions to be encapsulated in the data type definition. It also supports explicit defaults and CHECK conditions in the **CREATE TABLE** statement.
  - `NULL` default—By default, columns in Adaptive Server Enterprise default to `NOT NULL`, whereas in SAP Sybase IQ the default setting is `NULL`, to allow `NULL` values. This setting can be controlled using the `ALLOW_NULLS_BY_DEFAULT` option. See *ALLOW_NULLS_BY_DEFAULT Option [TSQL]*. To make your data definition statements transferable, explicitly specify `NULL` or `NOT NULL`.

Permissions

Table Type	Privileges Required
Base table in the IQ main store	Table owned by self – Requires CREATE privilege on the dbspace where the table is created. Also requires one of: • CREATE TABLE system privilege. • CREATE ANY OBJECT system privilege. Table owned by any user – Requires CREATE privilege on the dbspace where the table is created. Also requires one of: • CREATE ANY TABLE system privilege. • CREATE ANY OBJECT system privilege.
Global temporary table	Table owned by self – Requires one of: • CREATE TABLE system privilege. • CREATE ANY OBJECT system privilege. Table owned by any user – Requires one of: • CREATE ANY TABLE system privilege. • CREATE ANY OBJECT system privilege.
Proxy table	Table owned by self – Requires one of: • CREATE PROXY TABLE system privilege. • CREATE ANY TABLE system privilege. • CREATE ANY OBJECT system privilege. Table owned by any user – Requires one of: • CREATE ANY TABLE system privilege. • CREATE ANY OBJECT system privilege.

See also

- *ALLOW_NULLS_BY_DEFAULT Option [TSQL]* on page 469
- *ALTER TABLE Statement* on page 48
- *CREATE DBSPACE Statement* on page 114
- *CREATE INDEX Statement* on page 136
- *DECLARE LOCAL TEMPORARY TABLE Statement* on page 239
- *DROP Statement* on page 248
- *FP_NBIT_AUTOSIZE_LIMIT Option* on page 525
- *FP_NBIT_ENFORCE_LIMITS Option* on page 526
- *FP_NBIT_LOOKUP_MB Option* on page 529

- *FP_NBIT_ROLLOVER_MAX_MB Option* on page 530

CREATE TEXT CONFIGURATION Statement

Creates a text configuration object.

Note: This statement requires the Unstructured Data Analytics (IQ_UDA) license.

Syntax

```
CREATE TEXT CONFIGURATION [ owner.]new-config-name
  FROM [ owner.]existing-config-name
```

Examples

- **Example 1 –** Create a text configuration object, `max_term_sixteen`, using the `default_char` text configuration object, then use **ALTER TEXT CONFIGURATION** to change the maximum term length for `max_term_sixteen` to 16:

```
CREATE TEXT CONFIGURATION max_term_sixteen FROM default_char;

ALTER TEXT CONFIGURATION max_term_sixteen MAXIMUM TERM LENGTH 16;
```

Usage

Use **CREATE TEXT CONFIGURATION** to create a text configuration object.

Create a text configuration object using another text configuration object as a template, then alter the options as needed using the **ALTER TEXT CONFIGURATION** statement.

To view the list of all text configuration objects and their settings in the database, query the **SYSTEXTCONFIG** system view.

FROM clause – specifies the name of a text configuration object to use as the template for creating the new text configuration object. The names of the default text configuration objects are `default_char` and `default_nchar`. Only `default_char` is supported for SAP Sybase IQ tables; `default_nchar` is supported only on SQL Anywhere tables.

Side Effects:

- Automatic commit.

Permissions

Text configuration object to be owned by self –

- Requires CREATE TEXT CONFIGURATION system privilege.

Text configuration object to be owned by any user – Requires one of:

- CREATE ANY TEXT CONFIGURATION system privilege.
- CREATE ANY OBJECT system privilege.

All text configuration objects have PUBLIC access. Any user with privilege to create a **TEXT** index can use any text configuration object.

CREATE TEXT INDEX Statement

Creates a **TEXT** index.

Note: This statement requires the Unstructured Data Analytics (IQ_UDA) license.

Syntax

```
CREATE TEXT INDEX text-index-name
 ON [ owner.]table-name( column-name, ...)
   [ IN dbspace-name ]
   [ CONFIGURATION [ owner.]text-configuration-name]
   [ IMMEDIATE REFRESH ]
```

Examples

- **Example 1 –** Create a **TEXT** index, `myTxtIdx`, on the `CompanyName` column of the `Customers` table in the `iqdemo` database, using the `max_term_sixteen` text configuration object:

```
CREATE TEXT INDEX myTxtIdx ON Customers (CompanyName );

CONFIGURATION max_term_sixteen;
```

Usage

Use **CREATE TEXT INDEX** to create a **TEXT** index and to specify the text configuration object to use.

You cannot create a **TEXT** index on views or temporary tables. You cannot create a **TEXT** index on an IN SYSTEM materialized view.

The **BEGIN PARALLEL IQ…END PARALLEL IQ** statement does not support **CREATE TEXT INDEX**.

ON clause – specifies the table and column on which to build the **TEXT** index.

IN clause – specifies the dbspace in which the **TEXT** index is located. If this clause is not specified, then the **TEXT** index is created in the same dbspace as the underlying table.

CONFIGURATION clause – specifies the text configuration object to use when creating the **TEXT** index. If this clause is not specified, the `default_char` text configuration object is used.

REFRESH clause – **IMMEDIATE REFRESH** is used as the default and is the only permitted value for tables in SAP Sybase IQ. Specify **IMMEDIATE REFRESH** to refresh the **TEXT** index each time changes in the underlying table impact data in the **TEXT** index.

An **IMMEDIATE REFRESH TEXT** index is populated at creation and is refreshed whenever the data in the underlying column is changed. Once a **TEXT** index is created, you cannot change it to, or from, **IMMEDIATE REFRESH**.

Side Effects:

- Automatic commit.

Permissions

Requites one of:

- CREATE ANY INDEX system privilege along with CREATE privilege on the dbspace where the index is being created.
- CREATE ANY OBJECT system privilege.

CREATE TRIGGER statement

Creates a trigger on a table.

Syntax

```
CREATE [ OR REPLACE ] TRIGGER trigger-name trigger-type
{ trigger-event-list | UPDATE OF column-list }
[ ORDER integer ] ON table-name
[ REFERENCING [ OLD AS old-name ]
   [ NEW AS new-name ]
   [ REMOTE AS remote-name ] ]
[ FOR EACH { ROW | STATEMENT } ]
[ WHEN ( search-condition ) ]
trigger-body
```

```
column-list :  column-name[, ...]
```

```
trigger-type :
BEFORE
| AFTER
| INSTEAD OF
| RESOLVE
```

```
trigger-event-list : trigger-event[, ...  ]
```

```
trigger-event :
DELETE
| INSERT
| UPDATE ( column-name )
| UPDATING [ ( column-name-string ) ]
```

```
trigger-body : a BEGIN statement.
```

Parameters

OR REPLACE clause – Specifying OR REPLACE creates a new trigger, or replaces an existing trigger with the same name.

***trigger-event* –** Triggers can be fired by the following events. You can define either multiple triggers for DELETE, INSERT, or UPDATE events, or one trigger for an UPDATE OF *column-list* event:

- **DELETE clause –** Invoked whenever a row of the associated table is deleted.
- **INSERT clause –** Invoked whenever a new row is inserted into the table associated with the trigger.
- **UPDATE clause –** Invoked whenever a row of the associated table is updated.

  If you specify an UPDATE clause, you must also supply a REFERENCING clause to avoid syntax errors.
- **UPDATE OF *column-list* clause –** Invoked whenever a row of the associated table is updated and a column in the *column-list* is modified. This type of trigger event cannot be used in a *trigger-event-list*; it must be the only trigger event defined for the trigger. This clause cannot be used in an INSTEAD OF trigger.

  You can write separate triggers for each event that you need to handle or, if you have some shared actions and some actions that depend on the event, you can create a trigger for all events and use an IF statement to distinguish the action taking place.
- **UPDATING clause –** The argument for UPDATING is a quoted string (for example, `UPDATING( 'mycolumn' )`). The argument for UPDATE is an identifier (for example, `UPDATE( mycolumn )`). The two versions are interoperable, and are included for compatibility with SQL dialects of other vendors' DBMS.

  If you specify an UPDATING clause, then you must also supply a REFERENCING clause to avoid syntax errors.

***trigger-type* –** Row-level triggers can be defined to execute BEFORE, AFTER, or INSTEAD OF an insert, update, or delete operation. Statement-level triggers can be defined to execute INSTEAD OF or AFTER the statement.

BEFORE UPDATE triggers fire any time an UPDATE occurs on a row, whether the new value differs from the old value. That is, if a *column-list* is specified for a BEFORE UPDATE trigger, then the trigger fires if any of the columns in *column-list* appear in the SET clause of the UPDATE statement. If a *column-list* is specified for an AFTER UPDATE trigger, then the trigger is fired only if the value of any of the columns in *column-list* is *changed* by the UPDATE statement.

INSTEAD OF triggers are the only form of trigger that you can define on a regular view. INSTEAD OF triggers replace the triggering action with another action. When an INSTEAD OF trigger fires, the triggering action is skipped and the specified action is performed. INSTEAD OF triggers can be defined as a row-level or a statement-level trigger. A statement-

level INSTEAD OF trigger replaces the entire statement, including all row-level operations. If a statement-level INSTEAD OF trigger fires, then no row-level triggers fire as a result of that statement. However, the body of the statement-level trigger could perform other operations that, in turn, cause other row-level triggers to fire.

If you are defining an INSTEAD OF trigger, then you cannot use the UPDATE OF *column-list* clause, the ORDER clause, or the WHEN clause.

ORDER clause – When defining additional triggers of the same type (insert, update, or delete) to fire at the same time (before, after, or resolve), you must specify an ORDER clause to tell the database server the order in which to fire the triggers. Order numbers must be unique among same-type triggers configured to fire at the same time. If you specify an order number that is not unique, then an error is returned. Order numbers do not need to be in consecutive order (for example, you could specify 1, 12, 30). The database server fires the triggers starting with the lowest number.

If you omit the ORDER clause, or specify 0, then the database server assigns the order of 1. However, if another same-type trigger is already set to 1, then an error is returned.

When adding additional triggers, you may need to modify the existing same-type triggers for the event, depending on whether the actions of the triggers interact. If they do not interact, then the new trigger must have an ORDER value higher than the existing triggers. If they do interact, you need to consider what the other triggers do, and you may need to change the order in which they fire.

The ORDER clause is not supported for INSTEAD OF triggers since there can only be one INSTEAD OF trigger of each type (insert, update, or delete) defined on a table or view.

REFERENCING clause – The REFERENCING OLD and REFERENCING NEW clauses allow you to refer to the inserted, deleted, or updated rows. With this clause an UPDATE is treated as a delete followed by an insert.

An INSERT takes the REFERENCING NEW clause, which represents the inserted row. There is no REFERENCING OLD clause.

A DELETE takes the REFERENCING OLD clause, which represents the deleted row. There is no REFERENCING NEW clause.

An UPDATE takes the REFERENCING OLD clause, which represents the row before the update, and it takes the REFERENCING NEW clause, which represents the row after the update.

The meanings of REFERENCING OLD and REFERENCING NEW differ, depending on whether the trigger is a row-level or a statement-level trigger. For row-level triggers, the REFERENCING OLD clause allows you to refer to the values in a row before an update or delete, and the REFERENCING NEW clause allows you to refer to the inserted or updated values. The OLD and NEW rows can be referenced in BEFORE and AFTER triggers. The REFERENCING NEW clause allows you to modify the new row in a BEFORE trigger before the insert or update operation takes place.

For statement-level triggers, the REFERENCING OLD and REFERENCING NEW clauses refer to declared temporary tables holding the old and new values of the rows.

FOR EACH clause – To declare a trigger as a row-level trigger, use the FOR EACH ROW clause. To declare a trigger as a statement-level trigger, you can either use a FOR EACH STATEMENT clause or omit the FOR EACH clause. For clarity, it is recommended that you specify the FOR EACH STATEMENT clause if you are declaring a statement-level trigger.

WHEN clause – The trigger fires only for rows where the search-condition evaluates to true. The WHEN clause can be used only with row level triggers. This clause cannot be used in an INSTEAD OF trigger.

***trigger-body* –** The trigger body contains the actions to take when the triggering action occurs, and consists of a BEGIN statement.

You can include trigger operation conditions in the BEGIN statement. Trigger operation conditions perform actions depending on the trigger event that caused the trigger to fire. For example, if the trigger is defined to fire for both updates and deletes, you can specify different actions for the two conditions.

Remarks

The CREATE TRIGGER statement creates a trigger associated with a table in the database, and stores the trigger in the database.

You cannot define a trigger on a materialized view. If you do, a SQLE_INVALID_TRIGGER_MATVIEW error is returned.

A trigger is declared as either a row-level trigger, in which case it executes before or after each row is modified, or a statement-level trigger, in which case it executes after the entire triggering statement is completed.

CREATE TRIGGER puts a table lock on the table and requires exclusive use of the table.

Privileges

You must have the CREATE ANY TRIGGER or CREATE ANY OBJECT system privilege. Additionally, you must be the owner of the table the trigger is built on or have one of the following privileges:

ALTER privilege on the table
ALTER ANY TABLE system privilege
ALTER ANY OBJECT system privilege

To create a trigger on a view owned by someone else, you must have either the CREATE ANY TRIGGER or CREATE ANY OBJECT system privilege, and you must have either the ALTER ANY VIEW or ALTER ANY OBJECT system privilege.

Side effects

Automatic commit.

Standards and compatibility

- **SQL/2008 –** CREATE TRIGGER is part of optional SQL language feature T211 "Basic trigger capability" of the SQL/2008 standard. Row triggers are optional SQL language feature T212, while INSTEAD OF triggers are optional SQL language feature T213.

  Some features of SAP Sybase IQ triggers are vendor extensions. These include:

  - The optional OR REPLACE syntax. If an existing trigger is replaced, authorization of the creation of the new trigger instance is bypassed.
  - The ORDER clause. In SQL/2008, triggers are fired in the order they were created.
  - RESOLVE triggers are a vendor extension.
- **Transact-SQL –** ROW and RESOLVE triggers are not supported by Adaptive Server Enterprise. The SAP Sybase IQ Transact-SQL dialect does not support Transact-SQL INSTEAD OF triggers, though these are supported by Adaptive Server Enterprise. Transact-SQL triggers are defined using different syntax.

Example

This example creates a statement-level trigger. First, create a table as shown in this CREATE TABLE statement (requires the CREATE TABLE system privilege):

```
CREATE TABLE t0
( id INTEGER NOT NULL,
 times TIMESTAMP NULL DEFAULT CURRENT TIMESTAMP,
 remarks TEXT NULL,
 PRIMARY KEY ( id )
);
```

Next, create a statement-level trigger for this table:

```
CREATE TRIGGER myTrig AFTER INSERT ORDER 4 ON t0
REFERENCING NEW AS new_name
FOR EACH STATEMENT
BEGIN
  DECLARE @id1 INTEGER;
  DECLARE @times1 TIMESTAMP;
  DECLARE @remarks1 LONG VARCHAR;
  DECLARE @err_notfound EXCEPTION FOR SQLSTATE VALUE '02000';
//declare a cursor for table new_name
  DECLARE new1 CURSOR FOR
   SELECT id, times, remarks FROM new_name;
  OPEN new1;
 //Open the cursor, and get the value
  LoopGetRow:
  LOOP
      FETCH NEXT new1 INTO @id1, @times1,@remarks1;
      IF SQLSTATE = @err_notfound THEN
   LEAVE LoopGetRow
      END IF;
      //print the value or for other use
      PRINT (@remarks1);
  END LOOP LoopGetRow;
```

```
  CLOSE new1
END;
```

The following example replaces the myTrig trigger created in the previous example.

```
CREATE OR REPLACE TRIGGER myTrig AFTER INSERT ORDER 4 ON t0
REFERENCING NEW AS new_name
FOR EACH STATEMENT
BEGIN
FOR L1 AS new1 CURSOR FOR
   SELECT id, times, remarks FROM new_name
DO
     //print the value or for other use
     PRINT (@remarks1);
END FOR;
END;
```

The next example shows how you can use REFERENCING NEW in a BEFORE UPDATE trigger. This example ensures that postal codes in the new Employees table are in uppercase. You must have SELECT, ALTER, and UPDATE privileges on GROUPO.Employees to execute this statement:

```
CREATE TRIGGER emp_upper_postal_code
BEFORE UPDATE OF PostalCode
ON GROUPO.Employees
REFERENCING NEW AS new_emp
FOR EACH ROW
WHEN ( ISNUMERIC( new_emp.PostalCode ) = 0 )
BEGIN
   -- Ensure postal code is uppercase (employee might be
   -- in Canada where postal codes contain letters)
   SET new_emp.PostalCode = UPPER(new_emp.PostalCode)
END;

UPDATE GROUPO.Employees SET state='ON', PostalCode='n2x 4y7' WHERE
EmployeeID=191;
SELECT PostalCode FROM GROUPO.Employees WHERE EmployeeID = 191;
```

The next example shows how you can use REFERENCING OLD in a BEFORE DELETE trigger. This example prevents deleting an employee from the Employees table who has not been terminated.

```
CREATE TRIGGER TR_check_delete_employee
BEFORE DELETE
ON Employees
REFERENCING OLD AS current_employee
FOR EACH ROW WHEN ( current_employee.Terminate IS NULL )
BEGIN
    RAISERROR 30001 'You cannot delete an employee who has not been
fired';
END;
```

The next example shows how you can use REFERENCING NEW and REFERENCING OLD in a BEFORE UPDATE trigger. This example prevents a decrease in an employee's salary.

```
CREATE TRIGGER TR_check_salary_decrease
    BEFORE UPDATE
      ON GROUPO.Employees
    REFERENCING OLD AS before_update
    NEW AS after_update
FOR EACH ROW
BEGIN
   IF after_update.salary < before_update.salary THEN
    RAISERROR 30002 'You cannot decrease a salary';
    END IF;
END;
```

The next example shows how you can use REFERENCING NEW in a BEFORE INSERT and UPDATE trigger. The following example creates a trigger that fires before a row in the SalesOrderItems table is inserted or updated.

```
CREATE TRIGGER TR_update_date
   BEFORE INSERT, UPDATE
     ON GROUPO.SalesOrderItems
   REFERENCING NEW AS new_row
FOR EACH ROW
BEGIN
   SET new_row.ShipDate = CURRENT TIMESTAMP;
END;
```

The following trigger displays a message on the **Messages** tab of the Interactive SQL **Results** pane showing which action caused the trigger to fire.

```
CREATE TRIGGER tr BEFORE INSERT, UPDATE, DELETE
ON sample_table
REFERENCING OLD AS t1old
FOR EACH ROW
BEGIN
    DECLARE msg varchar(255);
    SET msg = 'This trigger was fired by an ';
    IF INSERTING THEN
        SET msg = msg || 'insert'
    ELSEIF DELETING THEN
        set msg = msg || 'delete'
    ELSEIF UPDATING THEN
        set msg = msg || 'update'
    END IF;
    MESSAGE msg TO CLIENT
END;
```

CREATE USER Statement

Creates a user.

Syntax

```
CREATE USER  user-name  [ IDENTIFIED BY password ]
[ LOGIN POLICY policy-name ]
[ FORCE PASSWORD CHANGE { ON | OFF } ]
```

Parameters

- **user-name –** name of the user.
- **IDENTIFIED BY –** provides the password for the user.
- **policy-name –** name of the login policy to assign the user. No change is made if you do not specify a login policy.
- **FORCE PASSWORD CHANGE –** controls whether the user must specify a new password upon logging in. This setting overrides the PASSWORD_EXPIRY_ON_NEXT_LOGIN option setting in the user's login policy.

  Note: This functionality is not currently implemented when logging in to Sybase Control Center. A user will not be prompted to change their password. He or she will be prompted, however, when logging in to SAP Sybase IQ outside of Sybase Control Center (for example, using Interactive SQL).
- **password –** You do not have to specify a password for the user. A user without a password cannot connect to the database. This is useful if you are creating a role and do not want anyone to connect to the database using the role user ID. A user ID must be a valid identifier.

  User IDs and passwords cannot:

  - Begin with white space, single quotes, or double quotes
  - End with white space
  - Contain semicolons

  A password can be either a valid identifier, or a string (maximum 255 characters) placed in single quotes. Passwords are case-sensitive. The password should be composed of 7-bit ASCII characters, as other characters may not work correctly if the database server cannot convert them from the client's character set to UTF-8.

  You can use the VERIFY_PASSWORD_FUNCTION option to specify a function to implement password rules (for example, passwords must include at least one digit). If you do use a password verification function, you cannot specify more than one user ID and password in the **GRANT CONNECT** statement.

  The encryption algorithm used for hashing the user passwords is FIPS-certified encryption support:

  - The DLL is called **dbfips10.dll**
  - The HASH function accepts the algorithms: **SHA1_FIPS SHA256_FIPS**
  - If the **-fips** server option is specified and an algorithm that is not FIPS-certified is given to the HASH function, the database server uses **SHA1_FIPS** instead of **SHA1**, **SHA256_FIPS** instead of **SHA256**, and returns an error if **MD5** is used (**MD5** is not a FIPS-certified algorithm).
  - If the **-fips** option is specified, the database server uses SHA256_FIPS for password hashing.

Examples

- **Example 1 –** creates a user named `SQLTester` with the password welcome. The `SQLTester` user is assigned to the `Test1` login policy and the password expires on the next login:

```
CREATE USER SQLTester IDENTIFIED BY welcome
LOGIN POLICY Test1
FORCE PASSWORD CHANGE ON;
```

Standards

- SQL – Vendor extension to ISO/ANSI SQL grammar.
- Sybase – Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *COMMENT Statement* on page 93
- *CREATE LOGIN POLICY Statement* on page 149
- *DROP LOGIN POLICY Statement* on page 256
- *DROP USER Statement* on page 268
- *GRANT ROLE Statement* on page 305
- *GRANT System Privilege Statement* on page 312
- *VERIFY_PASSWORD_FUNCTION Option* on page 647
- *ALTER LOGIN POLICY Statement* on page 24

CREATE VARIABLE Statement

Creates a SQL variable.

Syntax

```
CREATE
[OR REPLACE]
VARIABLE
identifier data-type
[{= | DEFAULT}
initial-value]
```

Parameters

- **initial-value –** *special-value* | *string* | [-] *number* | (*constant-expression*) | *built-in-function* (*constant-expression*) | **NULL**
- **special-value –** **CURRENT** { **DATABASE** | **DATE** | **PUBLISHER** | **TIME** | **TIMESTAMP** | **USER** | **UTC TIMESTAMP** } | **USER**

Examples

- **Example 1 –** This code fragment inserts a large text value into the database:

```
EXEC SQL BEGIN DECLARE SECTION;
char buffer[5000];
EXEC SQL END DECLARE SECTION;
EXEC SQL CREATE VARIABLE hold_blob VARCHAR;
EXEC SQL SET hold_blob = '';
for(;;) {
    /* read some data into buffer ... */
    size = fread( buffer, 1, 5000, fp );
    if( size <= 0 ) break;
    /* add data to blob using concatenation
    Note that concatenation works for binary
    data too! */
    EXEC SQL SET hold_blob = hold_blob || :buffer;
}
EXEC SQL INSERT INTO some_table VALUES ( 1, hold_blob );
EXEC SQL DROP VARIABLE hold_blob;
```

Usage

The **CREATE VARIABLE** statement creates a new variable of the specified data type. If you specify *initial-value*, the variable is set to that value. If you do not specify *initial-value*, the variable contains the NULL value until a **SET** statement assigns a different value.

Specifying the **OR REPLACE** clause drops the named variable if it already exists and replaces its definition. You can use the **OR REPLACE** clause as an alternative to the **VAREXISTS** function in SQL scripts.

A variable can be used in a SQL expression anywhere a column name is allowed. If a column name exists with the same name as the variable, the variable value is used.

A variable can be used in a SQL expression anywhere a column name is allowed. Name resolution is performed as follows:

- Match any aliases specified in the query's SELECT list.
- Match column names for any referenced tables.
- Assume the name is a variable.

Variables belong to the current connection, and disappear when you disconnect from the database, or when you use the **DROP VARIABLE** statement. Variables are not visible to other connections. **COMMIT** or **ROLLBACK** statements do not affect variables.

Variables created with the **CREATE VARIABLE** statement persist for a connection even when the statement is issued within a **(BEGIN...END)** statement. You must use **DECLARE** to create variables that only persist within a **(BEGIN...END)** statement, for example, within stored procedures.

Variables are useful for creating large text or binary objects for **INSERT** or **UPDATE** statements from Embedded SQL programs.

Local variables in procedures and triggers are declared within a compound statement.

If you specify **initial-value**, the data type must match the type defined by *data-type*.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

None

See also

- *BEGIN … END Statement* on page 81
- *DECLARE Statement* on page 231
- *DROP VARIABLE Statement* on page 269
- *SET Statement [ESQL]* on page 417

CREATE VIEW Statement

Creates a view on the database. Views are used to give a different perspective on the data even though it is not stored that way.

Syntax

```
CREATE [ OR REPLACE ] VIEW
… [ owner.]view-name [ ( column-name [ , … ] ) ]
… AS select-without-order-by
… [ WITH CHECK OPTION ]
```

Examples

- **Example 1 –** Create a view showing all information for male employees only. This view has the same column names as the base table:

```
CREATE VIEW male_employee
AS SELECT *
```

```
FROM Employees
WHERE Sex = 'M'
```

- **Example 2 –** Create a view showing employees and the departments to which they belong:

```
CREATE VIEW emp_dept
AS SELECT Surname, GivenName, DepartmentName
FROM Employees JOIN Departments
ON Employees.DepartmentID = Departments.DepartmentID
```

Usage

A view name can be used in place of a table name in **SELECT**, **DELETE**, **UPDATE**, and **INSERT** statements. Views, however, do not physically exist in the database as tables. They are derived each time they are used. The view is derived as the result of the **SELECT** statement specified in the **CREATE VIEW** statement. Table names used in a view should be qualified by the user ID of the table owner. Otherwise, a different user ID might not be able to find the table or might get the wrong table.

Specifying the **OR REPLACE** clause (CREATE OR REPLACE VIEW) creates a new view or replaces an existing view with the same name. Existing permissions are preserved when you use the **OR REPLACE** clause, but **INSTEAD OF** triggers on the view are dropped.

The columns in the view are given the names specified in the column name list. If the column name list is not specified, then the view columns are given names from the select list items. To use the names from the select list items, the items must be a simple column name or they must have an alias name specified (see *SELECT Statement*). You cannot add or drop IDENTIFY/AUTOINCREMENT columns from a view.

Views can be updated unless the **SELECT** statement defining the view contains a **GROUP BY** clause, an aggregate function, or involves a **UNION** operation. An update to the view causes the underlying tables to be updated.

view-name—An identifier. The default owner is the current user ID.

column-name—The columns in the view are given the names specified in the *column-name* list. If the column name list is not specified, the view columns are given names from the select list items. To use the names from the select list items, each item must be a simple column name or have an alias name specified (see *SELECT Statement*).

AS—The **SELECT** statement on which the view is based must not contain an **ORDER BY** clause, a subquery in the **SELECT** list, or a TOP or FIRST qualification. It may have a **GROUP BY** clause and may be a **UNION**.

WITH CHECK OPTION—Rejects any updates and inserts to the view that do not meet the criteria of the views as defined by its **SELECT** statement. However, SAP Sybase IQ currently ignores this option (it supports the syntax for compatibility reasons).

Side Effects

- Automatic commit

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

View to be owned by self – Requires CREATE VIEW system privilege. Also requires one of:

- SELECT ANY TABLE system privilege.
- SELECT object permission on the underlying tables of the view.

View to be owned by any user – Requires one of:

- CREATE ANY VIEW system privilege.
- CREATE ANY OBJECT system privilege.
- Also requires one of:
  - SELECT ANY TABLE system privilege.
  - SELECT object privilege on the underlying tables of the view.

Materialized view to be owned by self – Requires CREATE MATERIALIZED VIEW system privilege. Also requires one of:

- CREATE ANY OBJECT system privilege.
- CREATE privilege on the dbspace where the materialized view is being created.
- Also requires one of:
  - SELECT ANY TABLE system privilege.
  - SELECT privilege on the underlying tables of the materialized view.

Materialized view to be owned by any user – Requires one of:

- CREATE ANY MATERIALIZED VIEW system privilege.
- CREATE ANY OBJECT system privilege.
- Also requires one of:
  - CREATE ANY OBJECT system privilege.
  - CREATE privilege on the dbspace where the materialized view is being created.

  And also requires one of:
  - SELECT ANY TABLE system privilege.
  - SELECT privilege on the underlying tables of the materialized view.

See also

- *CREATE TABLE Statement* on page 197
- *DROP Statement* on page 248
- *SELECT Statement* on page 407

DEALLOCATE DESCRIPTOR Statement [ESQL]

Frees memory associated with a SQL descriptor area.

Syntax

```
DEALLOCATE DESCRIPTOR descriptor-name:
string
```

Examples

- **Example 1 –** See *ALLOCATE DESCRIPTOR Statement [ESQL]*.

Usage

Frees all memory associated with a descriptor area, including the data items, indicator variables, and the structure itself.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *ALLOCATE DESCRIPTOR Statement [ESQL]* on page 5
- *SET DESCRIPTOR Statement [ESQL]* on page 421

Declaration Section [ESQL]

Declares host variables in an Embedded SQL program. Host variables are used to exchange data with the database.

Syntax

```
EXEC SQL BEGIN DECLARE SECTION;
... C declarations
EXEC SQL END DECLARE SECTION;
```

Examples

- **Example 1 –**

```
EXEC SQL BEGIN DECLARE SECTION;
char *emp_lname, initials[5];
int dept;
EXEC SQL END DECLARE SECTION;
```

Usage

A declaration section is a section of C variable declarations surrounded by the **BEGIN DECLARE SECTION** and **END DECLARE SECTION** statements. A declaration section makes the SQL preprocessor aware of C variables that are used as host variables. Not all C declarations are valid inside a declaration section.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.

Permissions

None

See also

- *BEGIN … END Statement* on page 81

DECLARE Statement

Declares a SQL variable within a compound statement **(BEGIN... END)**.

Syntax

```
DECLARE
variable_name  [ , … ]
data-type  [{
=
| DEFAULT}
initial-value]
```

Parameters

- **initial-value –** *special-value* | *string* | [-] *number* | (*constant-expression*) | *built-in-function* (*constant-expression*) | **NULL**
- **special-value – CURRENT** { **DATABASE** | **DATE** | **PUBLISHER** | **TIME** | **TIMESTAMP** | **USER** | **UTC TIMESTAMP** } | **USER**

Examples

- **Example 1 –** This batch illustrates the use of the **DECLARE** statement and prints a message on the server window:

```
BEGIN
  DECLARE varname CHAR(61);
  SET varname = 'Test name';
  MESSAGE varname;
END
```

Usage

Variables used in the body of a procedure can be declared using the **DECLARE** statement. The variable persists for the duration of the compound statement in which it is declared and must be unique within the compound statement.

The body of a procedure is a compound statement, and variables must be declared immediately following **BEGIN**. In a Transact-SQL procedure or trigger, there is no such restriction.

If you specify **initial-value**, the variable is set to that value. If you do not specify an **initial-value**, the variable contains the NULL value until a **SET** statement assigns a different value.

If you specify **initial-value**, the data type must match the type defined by *data-type*.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Adaptive Server Enterprise.
  - To be compatible with Adaptive Server Enterprise, the variable name must be preceded by an @.
  - In Adaptive Server Enterprise, a variable that is declared in a procedure or trigger exists for the duration of the procedure or trigger. In SAP Sybase IQ, if a variable is declared inside a compound statement, it exists only for the duration of that compound statement (whether it is declared in an SAP Sybase IQ SQL or Transact-SQL compound statement).

Permissions

None

See also

- *BEGIN … END Statement* on page 81

DECLARE CURSOR Statement [ESQL] [SP]

Declares a cursor. Cursors are the primary means for manipulating the results of queries.

Syntax

```
DECLARE cursor-name
[   SCROLL
  | NO SCROLL
  | DYNAMIC SCROLL
]
CURSOR FOR
{ select-statement
| statement-name

| USING variable-name }
```

Parameters

- **cursor-name –** identifier
- **statement-name –** identifier | host-variable
- **column-name-list –** identifiers
- **variable-name –** identifier

Examples

- **Example 1 –** Declare a scroll cursor in Embedded SQL:

```
EXEC SQL DECLARE cur_employee SCROLL CURSOR
FOR SELECT * FROM Employees;
```

- **Example 2 –** Declare a cursor for a prepared statement in Embedded SQL:

```
EXEC SQL PREPARE employee_statement
FROM 'SELECT emp_lname FROM Employees';
EXEC SQL DECLARE cur_employee CURSOR
FOR employee_statement ;
```

- **Example 3 –** Use cursors in a stored procedure:

```
BEGIN
  DECLARE cur_employee CURSOR FOR
      SELECT emp_lname
      FROM Employees;
  DECLARE name CHAR(40);
  OPEN cur_employee;
  LOOP
    FETCH NEXT cur_employee INTO name;
    ...
  END LOOP;
```

```
  CLOSE cur_employee;
END
```

Usage

The **DECLARE CURSOR** statement declares a cursor with the specified name for a **SELECT** statement or a **CALL** statement.

- **SCROLL clause –** a cursor declared as SCROLL supports the NEXT, PRIOR, FIRST, LAST, ABSOLUTE, and RELATIVE options of the **FETCH** statement. A SCROLL cursor lets you fetch an arbitrary row in the result set while the cursor is open.
- **NO SCROLL clause –** a cursor declared as NO SCROLL is restricted to moving forward through the result set using only the **FETCH NEXT** and **FETCH ABSOLUTE (0)** seek operations.
- **DYNAMIC SCROLL clause –** a cursor declared as DYNAMIC SCROLL supports the NEXT, PRIOR, FIRST, LAST, ABSOLUTE, and RELATIVE options of the **FETCH** statement. A DYNAMIC SCROLL cursor lets you fetch an arbitrary row in the result set while the cursor is open.

  Since rows cannot be returned to once the cursor leaves the row, there are no sensitivity restrictions on the cursor. Consequently, when a NO SCROLL cursor is requested, SAP Sybase IQ supplies the most efficient kind of cursor, which is an asensitive cursor.
- **FOR statement-name clause –** statements are named using the **PREPARE** statement. Cursors can be declared only for a prepared **SELECT** or **CALL**.
- **FOR READ ONLY –** a cursor declared FOR READ ONLY may not be used in a positioned **UPDATE** or a positioned **DELETE** operation. **READ ONLY** is the default value of the **FOR** clause.

  A cursor declared FOR READ ONLY sees the version of table(s) on which the cursor is declared when the cursor is opened, not the version of table(s) at the time of the first **FETCH**.

  For example, when the cursor is fetched, only one row can be fetched from the table:

```
CREATE TABLE t1 ( c1 INT );
INSERT t1 VALUES ( 1 );

BEGIN
DECLARE t1_cursor CURSOR FOR SELECT * FROM t1
FOR READ ONLY;
OPEN t1_cursor;
INSERT t1 VALUES ( 2 );
FETCH T1_CURSOR;
END
```

- **FOR UPDATE clause –** you can update the cursor result set of a cursor declared FOR UPDATE. Only asensitive behavior is supported for updatable cursors; any other sensitivity is ignored.

When the cursor is opened, exclusive table locks are taken on all tables that are opened for update. Standalone **LOAD TABLE**, **UPDATE**, **INSERT**, **DELETE**, and **TRUNCATE** statements are not allowed on tables that are opened for update in the same transaction, since SAP Sybase IQ permits only one statement to modify a table at a time. You can open only one updatable cursor on a specific table at a time.

Updatable cursors are allowed to scroll, except over Open Client.

- **OF column-name-list clause –** the list of columns from the cursor result set (specified by the *select-statement*) defined as updatable.
- **USING variable-name clause –** you can declare a cursor on a variable in stored procedures and user-defined functions. The variable is a string containing a **SELECT** statement for the cursor. The variable must be available when the **DECLARE** is processed, and so must be one of the following:
  - A parameter to the procedure. For example:

```
create function get_row_count(in qry varchar)
returns int
begin
    declare crsr cursor using qry;
    declare rowcnt int;

    set rowcnt = 0;
    open crsr;
    lp: loop
        fetch crsr;
        if SQLCODE <> 0 then leave lp end if;
        set rowcnt = rowcnt + 1;
    end loop;
    return rowcnt;
end
```

  - Nested inside another **BEGIN…END** after the variable has been assigned a value. For example:

```
create procedure get_table_name(
  in id_value int, out tabname char(128))

begin
  declare qry varchar;

  set qry = 'select table_name from SYS.ISYSTAB ' ||
        'where table_id=' || string(id_value);
  begin
    declare crsr cursor using qry;

    open crsr;
    fetch crsr into tabname;
    close crsr;
 end
end
```

Embedded SQL

Statements are named using the **PREPARE** statement. Cursors can be declared only for a prepared **SELECT** or **CALL**.

Updatable Cursor Support

SAP Sybase IQ supports updatable cursors.

SAP Sybase IQ supports one type of cursor sensitivity, which is defined in terms of which changes to underlying data are visible. All SAP Sybase IQ cursors are asensitive, which means that changes might be reflected in the membership, order, or values of the result set seen through the cursor, or might not be reflected at all.

With an asensitive cursor, changes effected by positioned **UPDATE** and positioned **DELETE** statements are visible in the cursor result set, except where client-side caching prevents seeing these changes. Inserted rows are not visible.

Rows that are updated so that they no longer meet the requirements of the **WHERE** clause of the open cursor are still visible.

When using cursors, there is always a trade-off between efficiency and consistency. Asensitive cursors provide efficient performance at the expense of consistency.

SAP Sybase IQ supports updatable cursors on single tables.

`LONG VARCHAR` and `LONG BINARY` data types are not supported in updatable cursors.

Scalar user-defined functions and user-defined aggregate functions are not supported in updatable cursors.

Supported query specifications for updatable cursors in SAP Sybase IQ are:

- Expressions in the select list against columns that are not functionally dependent on columns being updated
- Arbitrary subqueries with asensitive behavior, that is, changes to data referenced by subqueries are not visible in the cursor result set
- **ORDER BY** clause; the **ORDER BY** columns may be updated, but the result set does not reorder
- Columns that meet these requirements:
  - No CAST on a column
  - Base columns of a base table in the **SELECT** clause
  - There are no expressions or functions on that column in the **SELECT** clause and it is not duplicated in the select list (for example, `SELECT c1, c1`).
  - Base columns of a base table restricted to those listed in the **FOR UPDATE OF** *column-name-list* clause, if the clause is specified.

SAP Sybase IQ does not permit updatable cursors on queries that contain any operator that precludes a one-to-one mapping of result set rows to rows in a base table; specifically:

- **SELECT DISTINCT**

- Operator that has a **UNION**
- Operator that has a **GROUP BY**
- Operator that has a **SET** function
- Operator that has an **OLAP** function, with the exception of **RANK()**

See the description of the *UPDATE (positioned) Statement [ESQL] [SP]* for information on the columns and expressions allowed in the **SET** clause for the update of a row in the result set of a cursor.

SAP Sybase IQ supports inserts only on updatable cursors where all nonnullable, nonidentity columns are both selected and updatable.

In SAP Sybase IQ, **COMMIT** and **ROLLBACK** are not allowed inside an open updatable cursor, even if the cursor is opened as a hold cursor. SAP Sybase IQ does support **ROLLBACK TO SAVEPOINT** inside an updatable cursor.

Any failure that occurs after the cursor is open results in a rollback of all operations that have been performed through this open cursor.

Updatable Cursor Limitations

A declared cursor is read-only and not updatable in cases where:

- The data extraction facility is enabled with the `TEMP_EXTRACT_NAME1` option set to a pathname
- `ANSI_CLOSE_CURSORS_ON_ROLLBACK` is set OFF
- CHAINED is set OFF
- The statement is **INSERT SELECT** or **SELECT INTO**
- More than one table is included
- No updatable columns exist

If SAP Sybase IQ fails to set an updatable cursor when requested, see the `.iqmsg` file for related information.

There is a limitation regarding updatable cursors and ODBC. A maximum of 65535 rows or records can be updated, deleted, or inserted at a time using these ODBC functions:

- **SQLSetPos SQL_UPDATE**, **SQL_DELETE**, and **SQL_ADD**
- **SQLBulkOperations SQL_ADD**, **SQL_UPDATE_BY_BOOKMARK**, and **SQL_DELETE_BY_BOOKMARK**

There is an implementation-specific limitation to the maximum value in the statement attribute that controls the number of effected rows to the largest value of an `UNSIGNED SMALL INT`, which is 65535.

```
SQLSetStmtAttr(HANDLE,SQL_ATTR_ROW_ARRAY_SIZE, VALUE,0)
```

Updatable Cursor Differences

SAP Sybase IQ updatable cursors differ from ANSI SQL3 standard behavior as follows:

- Hold cursor update close on commit.
- SAP Sybase IQ locks tables when the cursor is open.
- All updates, deletes, and insert operations are applied when the cursor is closed, in this order: deletes first, then updates, then inserts.

Note: Use the **sp_iqcursorinfo** system procedure to display detailed information about cursors currently open on the server.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *CALL Statement* on page 86
- *DELETE (positioned) Statement [ESQL] [SP]* on page 243
- *FETCH Statement [ESQL] [SP]* on page 276
- *OPEN Statement [ESQL] [SP]* on page 360
- *PREPARE Statement [ESQL]* on page 366
- *SELECT Statement* on page 407
- *UPDATE (positioned) Statement [ESQL] [SP]* on page 442

DECLARE CURSOR Statement [T-SQL]

Declares a cursor that is compatible with Adaptive Server Enterprise.

Syntax

```
DECLARE cursor-name
… CURSOR FOR select-statement
…[ FOR { READ ONLY | UPDATE } ]
```

Usage

SAP Sybase IQ supports a **DECLARE CURSOR** syntax that is not supported in Adaptive Server Enterprise. For information on the full **DECLARE CURSOR** syntax, see *DECLARE CURSOR Statement [ESQL] [SP]*.

Note: Use the **sp_iqcursorinfo** system procedure to display detailed information about cursors currently open on the server.

Standards

- SQL—The FOR UPDATE and FOR READ ONLY options are Transact-SQL extensions to ISO/ANSI SQL grammar.
- Sybase—There are some features of the Adaptive Server Enterprise **DECLARE CURSOR** statement that are not supported in SAP Sybase IQ.
  - In the SAP Sybase IQ dialect, **DECLARE CURSOR** in a procedure or batch must immediately follow the BEGIN keyword. In the Transact-SQL dialect, there is no such restriction.
  - In Adaptive Server Enterprise, when a cursor is declared in a procedure or batch, it exists for the duration of the procedure or batch. In SAP Sybase IQ, if a cursor is declared inside a compound statement, it exists only for the duration of that compound statement (whether it is declared in an SAP Sybase IQ or Transact-SQL compound statement).

Permissions

None

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233

DECLARE LOCAL TEMPORARY TABLE Statement

Declares a local temporary table.

Syntax

```
DECLARE LOCAL TEMPORARY TABLE table-name
… ( column-definition [ column-constraint ] …
[ , column-definition [ column-constraint ] … ]
[ , table-constraint ] … )
…[ ON COMMIT { DELETE | PRESERVE } ROWS
NOT TRANSACTIONAL ]
```

Examples

- **Example 1 –** Declare a local temporary table in Embedded SQL:

```
EXEC SQL DECLARE LOCAL TEMPORARY TABLE MyTable (
  number INT
  );
```

- **Example 2 –** Declare a local temporary table in a stored procedure:

```
BEGIN
  DECLARE LOCAL TEMPORARY TABLE TempTab (
    number INT
  );
```

```
  ...
END
```

Usage

DECLARE LOCAL TEMPORARY TABLE declares a temporary table.

A local temporary table and the rows in it are visible only to the connection that created the table and inserted the rows. By default, the rows of a temporary table are deleted on **COMMIT**.

Declared local temporary tables within compound statements exist within the compound statement. Otherwise, the declared local temporary table exists until the end of the connection.

See *CREATE TABLE Statement* for definitions of *column-definition*, *column-constraint*, and *table-constraint*, and the NOT TRANSACTIONAL clause. See *SELECT Statement* for an example of how to select data into a temporary table.

Once you create a local temporary table, either implicitly or explicitly, you cannot create another temporary table of that name for as long as the temporary table exists. For example, you can create a local temporary table implicitly:

```
select * into #tmp from table1
```

or you can create a local temporary table with an explicit by declaration:

```
declare local temporary table foo
```

Then if you try to select into `#tmp` or `foo`, or declare `#tmp` or `foo` again, you receive an error indicating that `#tmp` or `foo` already exists.

When you declare a local temporary table, omit the owner specification. If you specify the same `owner.table` in more than one **DECLARE LOCAL TEMPORARY TABLE** statement in the same session, a syntax error is reported. For example, an error is reported when these statements are executed in the same session:

```
DECLARE LOCAL TEMPORARY TABLE user1.temp(col1 int);
DECLARE LOCAL TEMPORARY TABLE user1.temp(col1 int);
```

If the owner name is omitted, then the error `Item temp already exists` is reported:

```
DECLARE LOCAL TEMPORARY TABLE temp(col1 int);
DECLARE LOCAL TEMPORARY TABLE temp(col1 int);
```

An attempt to create a base table or a global temporary table fails, if a local temporary table of the same name exists on that connection, as the new table cannot be uniquely identified by *owner.table*.

You can, however, create a local temporary table with the same name as an existing base table or global temporary table. References to the table name access the local temporary table, as local temporary tables are resolved first.

For example, consider this sequence:

```
CREATE TABLE t1 (c1 int);
INSERT t1 VALUES (9);

DECLARE LOCAL TEMPORARY TABLE t1 (c1 int);
INSERT t1 VALUES (8);

SELECT * FROM t1;
```

The result returned is 8. Any reference to `t1` refers to the local temporary table `t1` until the local temporary table is dropped by the connection.

You cannot use the **ALTER TABLE** and **DROP INDEX** statements on local temporary tables.

You cannot use the **sp_iqindex**, **sp_iqtablesize**, and **sp_iqindexsize** stored procedures on local temporary tables.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Adaptive Server Enterprise does not support **DECLARE TEMPORARY TABLE**.

Permissions

None

See also

- *CREATE TABLE Statement* on page 197
- *SELECT Statement* on page 407

DELETE Statement

Deletes rows from the database.

Syntax

```
DELETE [ FROM ] [ owner.]table-name
…[ FROM table-list ]
…[ WHERE search-condition ]
```

Examples

- **Example 1 –** Remove employee 105 from the database:

  ```
  DELETE
  FROM Employees
  WHERE EmployeeID = 105
  ```

- **Example 2 –** Remove all data prior to 1993 from the `FinancialData` table:

```
DELETE
FROM FinancialData
WHERE Year < 1993
```

- **Example 3 –** Remove all names from the `Contacts` table if they are already present in the `Customers` table:

```
DELETE
FROM Contacts
FROM Contacts, Customers
WHERE Contacts.Surname = Customers.Surname
AND Contacts.GivenName = Customers.GivenName
```

Usage

DELETE deletes all the rows from the named table that satisfy the search condition. If no **WHERE** clause is specified, all rows from the named table are deleted.

DELETE can be used on views provided the **SELECT** statement defining the view has only one table in the **FROM** clause and does not contain a **GROUP BY** clause, an aggregate function, or involve a **UNION** operation.

The optional second **FROM** clause in the **DELETE** statement allows rows to be deleted based on joins. If the second **FROM** clause is present, the **WHERE** clause qualifies the rows of this second **FROM** clause. Rows are deleted from the table name given in the first **FROM** clause.

Note: You cannot use the **DELETE** statement on a join virtual table. If you attempt to delete from a join virtual table, an error is reported.

Correlation Name Resolution

This statement illustrates a potential ambiguity in table names in **DELETE** statements with two **FROM** clauses that use correlation names:

```
DELETE
FROM table_1
FROM table_1 AS alias_1, table_2 AS alias_2
WHERE ...
```

The table `table_1` is identified without a correlation name in the first **FROM** clause, but with a correlation name in the second **FROM** clause. In this case, `table_1` in the first clause is identified with `alias_1` in the second clause; there is only one instance of **table_1** in this statement.

This is an exception to the general rule that where a table is identified with a correlation name and without a correlation name in the same statement, two instances of the table are considered.

Consider this example:

```
DELETE
FROM table_1
FROM table_1 AS alias_1, table_1 AS alias_2
WHERE ...
```

In this case, there are two instances of `table_1` in the second **FROM** clause. There is no way of identifying which instance the first **FROM** clause should be identified with. The usual rules of correlation names apply, and `table_1` in the first **FROM** clause is identified with neither instance in the second clause: there are three instances of `table_1` in the statement.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise, including the vendor extension.

Permissions

Requires DELETE privilege on the table.

See also

- *FROM Clause* on page 288
- *INSERT Statement* on page 320
- *TRUNCATE Statement* on page 435

DELETE (positioned) Statement [ESQL] [SP]

Deletes the data at the current location of a cursor.

Syntax

```
DELETE [ FROM table-spec ]
WHERE CURRENT OF cursor-name
```

Parameters

- **cursor-name –** *identifier* | *hostvar*
- **table-spec –** [*owner.*]*correlation-name*
- **owner –** *identifier*

Examples

- **Example 1 –** Remove the current row from the database:

```
DELETE WHERE CURRENT OF cur_employee
```

Usage

This form of the **DELETE** statement deletes the current row of the specified cursor. The current row is defined to be the last row fetched from the cursor.

The table from which rows are deleted is determined as follows:

- If no **FROM** clause is included, the cursor can only be on a single table.
- If the cursor is for a joined query (including using a view containing a join), you must use the **FROM** clause. Only the current row of the specified table is deleted. The other tables involved in the join are not affected.
- If you include a **FROM** clause and do not specify table owner, *table-spec* is first matched against any correlation names.
  - If a correlation name exists, *table-spec* is identified with the correlation name.
  - If a correlation name does not exist, *table-spec* must be unambiguously identifiable as a table name in the cursor.
- If a **FROM** clause is included, and a table owner is specified, table-spec must be unambiguously identifiable as a table name in the cursor.

The positioned **DELETE** statement can be used on a cursor open on a view as long as the view is updatable.

Changes effected by positioned **DELETE** statements are visible in the cursor result set, except where client-side caching prevents seeing these changes.

Standards

- SQL—The range of cursors that can be updated may contain vendor extensions to ISO/ANSI SQL grammar if the `ANSI_UPDATE_CONSTRAINTS` option is set to OFF.
- Sybase—Embedded SQL use is supported by Open Client/Open Server. Procedure and trigger use is supported in SQL Anywhere.

Permissions

Requires DELETE privilege on tables used in the cursor.

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *INSERT Statement* on page 320
- *UPDATE Statement* on page 438
- *UPDATE (positioned) Statement [ESQL] [SP]* on page 442

DESCRIBE Statement [ESQL]

Gets information about the host variables required to store data retrieved from the database or host variables used to pass data to the database.

Syntax

```
DESCRIBE
... [ USER TYPES ]
... [ { ALL | BIND VARIABLES FOR | INPUT
```

```
| OUTPUT | SELECT LIST FOR } ]
…[ { LONG NAMES [ long-name-spec ] | WITH VARIABLE RESULT } ]
…[ FOR ] { statement-name | CURSOR cursor-name }
…INTO sqlda-name
```

Parameters

- **long-name-spec –** { **OWNER.TABLE.COLUMN** | **TABLE.COLUMN** | **COLUMN** }
- **statement-name –** identifier | host-variable
- **cursor-name –** declared cursor
- **sqlda-name –** identifier

Examples

- **Example 1 –** How to use the **DESCRIBE** statement:

```
sqlda = alloc_sqlda( 3 );
EXEC SQL DESCRIBE OUTPUT
  FOR employee_statement
  INTO sqlda;
if( sqlda->sqld  >  sqlda->sqln ) {
  actual_size = sqlda->sqld;
  free_sqlda( sqlda );
  sqlda = alloc_sqlda( actual_size );
  EXEC SQL DESCRIBE OUTPUT
    FOR employee_statement
    INTO sqlda;
}
```

Usage

DESCRIBE sets up the named SQLDA to describe either the **OUTPUT** (equivalently **SELECT LIST**) or the **INPUT (BIND VARIABLES)** for the named statement.

In the **INPUT** case, **DESCRIBE BIND VARIABLES** does not set up the data types in the SQLDA: this needs to be done by the application. The ALL keyword lets you describe **INPUT** and **OUTPUT** in one SQLDA.

If you specify a statement name, the statement must have been previously prepared using the **PREPARE** statement with the same statement name and the SQLDA must have been previously allocated (see *ALLOCATE DESCRIPTOR Statement [ESQL]*).

If you specify a cursor name, the cursor must have been previously declared and opened. The default action is to describe the **OUTPUT**. Only **SELECT** statements and **CALL** statements have **OUTPUT**. A **DESCRIBE OUTPUT** on any other statement, or on a cursor that is not a dynamic cursor, indicates no output by setting the **sqld** field of the SQLDA to zero.

USER TYPES—A **DESCRIBE** statement with the **USER TYPES** clause returns information about user-defined data types of a column. Typically, such a **DESCRIBE** is done when a previous **DESCRIBE** returns an indicator of DT_HAS_USERTYPE_INFO.

The information returned is the same as for a **DESCRIBE** without the **USER TYPES** keywords, except that the **sqlname** field holds the name of the user-defined data type, instead of the name of the column.

If **DESCRIBE** uses the **LONG NAMES** clause, the **sqldata** field holds this information.

SELECT—**DESCRIBE OUTPUT** fills in the data type and length in the SQLDA for each select list item. The name field is also filled in with a name for the select list item. If an alias is specified for a select list item, the name is that alias. Otherwise, the name derives from the select list item: if the item is a simple column name, it is used; otherwise, a substring of the expression is used. **DESCRIBE** also puts the number of select list items in the **sqld** field of the SQLDA.

If the statement being described is a **UNION** of two or more **SELECT** statements, the column names returned for **DESCRIBE OUTPUT** are the same column names which would be returned for the first **SELECT** statement.

CALL—The **DESCRIBE OUTPUT** statement fills in the data type, length, and name in the SQLDA for each **INOUT** or **OUT** parameter in the procedure. **DESCRIBE OUTPUT** also puts the number of **INOUT** or **OUT** parameters in the **sqld** field of the SQLDA.

CALL (result set)— **DESCRIBE OUTPUT** fills in the data type, length, and name in the SQLDA for each RESULT column in the procedure definition. **DESCRIBE OUTPUT** also puts the number of result columns in the **sqld** field of the SQLDA.

INPUT—A bind variable is a value supplied by the application when the database executes the statements. Bind variables can be considered parameters to the statement. **DESCRIBE INPUT** fills in the name fields in the SQLDA with the bind variable names. **DESCRIBE INPUT** also puts the number of bind variables in the **sqld** field of the SQLDA.

DESCRIBE uses the indicator variables in the SQLDA to provide additional information. DT_PROCEDURE_IN and DT_PROCEDURE_OUT are bits that are set in the indicator variable when a **CALL** statement is described. DT_PROCEDURE_IN indicates an **IN** or **INOUT** parameter and DT_PROCEDURE_OUT indicates an **INOUT** or **OUT** parameter. Procedure RESULT columns has both bits clear. After a describe **OUTPUT**, these bits can be used to distinguish between statements that have result sets (need to use **OPEN**, **FETCH**, **RESUME**, **CLOSE**) and statements that do not (need to use **EXECUTE**). **DESCRIBE INPUT** sets DT_PROCEDURE_IN and DT_PROCEDURE_OUT appropriately only when a bind variable is an argument to a **CALL** statement; bind variables within an expression that is an argument in a **CALL** statement sets the bits.

DESCRIBE ALL lets you describe **INPUT** and **OUTPUT** with one request to the database server. This has a performance benefit in a multiuser environment. The **INPUT** information is filled in the SQLDA first, followed by the **OUTPUT** information. The **sqld** field contains the total number of **INPUT** and **OUTPUT** variables. The DT_DESCRIBE_INPUT bit in the indicator variable is set for **INPUT** variables and clear for **OUTPUT** variables.

- **Retrieving Long Column Names –** the **LONG NAMES** clause is provided to retrieve column names for a statement or cursor. Without this clause, there is a 29-character limit on the length of column names: with the clause, names of an arbitrary length are supported.

  If **LONG NAMES** is used, the long names are placed into the SQLDATA field of the SQLDA, as if you were fetching from a cursor. None of the other fields (`SQLLEN`, `SQLTYPE`, and so on) are filled in. The SQLDA must be set up like a **FETCH** SQLDA: it must contain one entry for each column, and the entry must be a string type.

  The default specification for the long names is TABLE.COLUMN.
- **Describing Variable Result Sets –** The **WITH VARIABLE RESULT** statement is used to describe procedures that might have more than one result set, with different numbers or types of columns.

  If **WITH VARIABLE RESULT** is used, the database server sets the SQLCOUNT value after the describe to one of these values:

  - 0—The result set may change: the procedure call should be described again following each **OPEN** statement.
  - 1—The result set is fixed. No redescribing is required.

Standards

- SQL— Some clauses are vendor extensions to ISO/ANSI SQL grammar.
- Sybase—Some clauses supported by Open Client/Open Server.

Permissions

None

See also

- *ALLOCATE DESCRIPTOR Statement [ESQL]* on page 5
- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *OPEN Statement [ESQL] [SP]* on page 360
- *PREPARE Statement [ESQL]* on page 366

DISCONNECT Statement [Interactive SQL]

Drops a connection with the database.

Syntax

DISCONNECT [{ *connection-name* | **CURRENT** | **ALL** }]

Parameters

- **connection-name –** identifier, string, or host-variable

Examples

- **Example 1 –** How to use **DISCONNECT** in Embedded SQL:

```
EXEC SQL DISCONNECT :conn_name
```

- **Example 2 –** How to use **DISCONNECT** from **dbisql** to disconnect all connections:

```
DISCONNECT ALL
```

Usage

The **DISCONNECT** statement drops a connection with the database server and releases all resources used by it. If the connection to be dropped was named on the **CONNECT** statement, then the name can be specified. Specifying **ALL** drops all of the connections of the application to all database environments. **CURRENT** is the default and drops the current connection.

An implicit **ROLLBACK** is executed on connections that are dropped.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *CONNECT Statement [ESQL] [Interactive SQL]* on page 101
- *SET CONNECTION Statement [ESQL] [Interactive SQL]* on page 420

DROP Statement

Removes objects from the database.

Syntax

```
DROP
{ DBSPACE dbspace-name
| { DATATYPE [ IF EXISTS ]
| DOMAIN [ IF EXISTS ] } datatype-name
| EVENT [ IF EXISTS ]  event-name
| INDEX [ IF EXISTS ]  [ [ owner].table-name.]index-name
| MESSAGE message-number
```

```
| TABLE [ IF EXISTS ]  [ owner.]table-name
| VIEW [ IF EXISTS ]  [ owner.]view-name
| MATERIALIZED VIEW [ IF EXISTS ]  [ owner.]view-name
| PROCEDURE [ IF EXISTS ]  [ owner.]procedure-name
| FUNCTION [ IF EXISTS ]  [ owner.]function-name }
```

Examples

- **Example 1 –** Drop the `Departments` table from the database:

  ```
  DROP TABLE Departments
  ```

- **Example 2 –** Drop the `emp_dept` view from the database:

  ```
  DROP VIEW emp_dept
  ```

Usage

DROP removes the definition of the indicated database structure. If the structure is a dbspace, then all tables with any data in that dbspace must be dropped or relocated prior to dropping the dbspace; other structures are automatically relocated. If the structure is a table, all data in the table is automatically deleted as part of the dropping process. Also, all indexes and keys for the table are dropped by **DROP TABLE**.

Use the **IF EXISTS** clause if you do not want an error returned when the **DROP** statement attempts to remove a database object that does not exist.

DROP INDEX deletes any explicitly created index. It deletes an implicitly created index only if there are no unique or foreign-key constraints or associated primary key.

DROP INDEX for a nonunique **HG** index fails if an associated unenforced foreign key exists.

Warning! Do not delete views owned by the DBO user. Deleting such views or changing them into tables might cause problems.

DROP TABLE, **DROP INDEX**, and **DROP DBSPACE** are prevented whenever the statement affects a table that is currently being used by another connection.

DROP TABLE is prevented if the primary table has foreign-key constraints associated with it, including unenforced foreign-key constraints

DROP TABLE is also prevented if the table has an IDENTITY column and IDENTITY_INSERT is set to that table. To drop the table you must clear IDENTITY_INSERT, that is, set IDENTITY_INSERT to '' (an empty string), or set to another table name.

A foreign key can have either a nonunique single or a multicolumn **HG** index. A primary key may have unique single or multicolumn **HG** indexes. You cannot drop the **HG** index implicitly created for an existing foreign key, primary key, and unique constraint.

The four initial dbspaces are `SYSTEM`, `IQ_SYSTEM_MAIN`, `IQ_SYSTEM_TEMP`, and `IQ_SYSTEM_MSG`. You cannot drop these initial dbspaces, but you may drop dbspaces from

the IQ main store or catalog store, which may contain multiple dbspaces, as long as at least one dbspace remains with readwrite mode.

You must drop tables in the dbspace before you can drop the dbspace. An error is returned if the dbspace still contains user data; other structures are automatically relocated when the dbspace is dropped. You can drop a dbspace only after you make it read-only.

Note: A dbspace may contain data at any point after it is used by a command, thereby preventing a **DROP DBSPACE** on it.

DROP PROCEDURE is prevented when the procedure is in use by another connection.

DROP DATATYPE is prevented if the data type is used in a table. You must change data types on all columns defined on the user-defined data type to drop the data type. It is recommended that you use **DROP DOMAIN** rather than **DROP DATATYPE**, as **DROP DOMAIN** is the syntax used in the ANSI/ISO SQL3 draft.

Side Effects

- Automatic commit. Clears the Data window in **dbisql**. **DROP TABLE** and **DROP INDEX** close all cursors for the current connection.
- Local temporary tables are an exception; no commit is performed when one is dropped.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

DBSPACE clause – Requires the DROP ANY OBJECT system privilege and user must be the only connection to the database.

DOMAIN clause – Requires one of:

- DROP DATATYPE system privilege.
- DROP ANY OBJECT system privilege.
- You own the object.

FUNCTION clause – Requires one of:

- DROP ANY PROCEDURE system privilege.
- DROP ANY OBJECT system privilege.
- You own the function.

INDEX clause – Requires one of:

- DROP ANY INDEX system privilege.
- DROP ANY OBJECT system privilege.

- REFERENCE privilege on the underlying table being indexed.
- You own the underlying table being indexed.

DBA or users with the appropriate privilege can drop an index on tables that are owned other users without using a fully-qualified name. All other users must provide a fully-qualified index name to drop an index on a base table owned by the DBA.

MATERIALIZED VIEW clause – Requires one of:

- DROP ANY MATERIALIZED VIEW system privilege.
- DROP ANY OBJECT system privilege.
- You own the materialized view.

PROCEDURE clause – Requires one of:

- DROP ANY PROCEDURE system privilege.
- DROP ANY OBJECT system privilege.
- You own the procedure.

TABLES clause – Requires one of:

- DROP ANY TABLE system privilege.
- DROP ANY OBJECT system privilege.
- You own the table.

Global temporary tables cannot be dropped unless all users that have referenced the temporary table have disconnected.

VIEW clause – Requires one of:

- DROP ANY VIEW system privilege.
- DROP ANY OBJECT system privilege.
- You own the view.

All other clauses – Requires one of:

- DROP ANY OBJECT system privilege.
- You own the object.

DROP CONNECTION Statement

Drops any user connection to the database.

Syntax

```
DROP CONNECTION connection-id
```

Examples

- **Example 1 –** Drop connection with ID number 4:

```
DROP CONNECTION 4
```

Usage

DROP CONNECTION disconnects a user from the database by dropping the connection to the database. You cannot drop your current connection; you must first create another connection, then drop your first connection.

The *connection-id* for the connection is obtained using the **connection_property** function to request the connection number. This statement returns the connection ID of the current connection:

```
SELECT connection_property( 'number' )
```

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the DROP CONNECTION system privilege.

See also

- *CONNECT Statement [ESQL] [Interactive SQL]* on page 101

DROP DATABASE Statement

Drops a database and its associated dbspace segment files.

Syntax

DROP DATABASE *db-filename* [**KEY** *key-spec*]

Parameters

- **key-spec –** A string, including mixed cases, numbers, letters, and special characters. It might be necessary to protect the key from interpretation or alteration by the command shell.

Examples

- **Example 1 –** Drop database `mydb`:

```
DROP DATABASE 'mydb.db'
```

- **Example 2 –** Drop the encrypted database `marvin.db`, which was created with the key `is!seCret`:

```
DROP DATABASE 'marvin.db' KEY 'is!seCret'
```

- **Example 3 –** This UNIX example drops the database `temp.db` from the `/s1/temp` directory:

```
DROP DATABASE '/s1/temp/temp.db'
```

Usage

DROP DATABASE drops all the database segment files associated with the IQ store and temporary store before it drops the catalog store files.

You must stop a database before you can drop it. If the connection parameter **AUTOSTOP=no** is used, you may need to issue a **STOP DATABASE** statement.

The `db-filename` you specify corresponds to the database file name you defined for the database using **CREATE DATABASE**. If you specified a directory path for this value in the **CREATE DATABASE** command, you must also specify the directory path for **DROP DATABASE**. Otherwise, SAP Sybase IQ looks for the database files in the default directory where the server files reside.

You cannot execute a **DROP DATABASE** statement to drop an IQ database that has a DatabaseStart event defined for it.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

The permissions required to execute this statement are set using the **-gu** server command line option, as follows:

- **NONE –** No user can issue this statement.
- **DBA –** Requires the SERVER OPERATOR system privilege.
- **UTILITY_DB –** Only those users who can connect to the `utility_db` database can issue this statement.

See also

- *CREATE DATABASE Statement* on page 103
- *STOP DATABASE Statement [Interactive SQL]* on page 432

DROP EXTERNLOGIN Statement

Drops an external login from the SAP Sybase IQ system tables.

Syntax

```
DROP EXTERNLOGIN login-name
TO remote-server
```

Examples

- **Example 1 –**

```
DROP EXTERNLOGIN dba TO sybase1
```

Usage

Changes made by **DROP EXTERNLOGIN** do not take effect until the next connection to the remote server.

DROP EXTERNLOGIN deletes an external login from the SAP Sybase IQ system tables.

- **login-name clause –** specifies the local user login name.
- **TO clause –** specifies the name of the remote server. The alternate login name of the local user and password for that server is the external login that is deleted.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *CREATE EXTERNLOGIN Statement* on page 127

DROP LDAP SERVER Statement

Removes the named LDAP server configuration object from the SYSLDAPSERVER system view after verifying that the LDAP server configuration object is not in a READY or ACTIVE state.

The **DROP LDAP SERVER** statement fails when it is issued against an LDAP server configuration object that is in a READY or ACTIVE state. This ensures that an LDAP server configuration object in active use cannot be accidentally dropped. The **DROP LDAP SERVER** statement also fails if a login policy exists with a reference to the LDAP server configuration object.

Syntax

```
DROP LDAP SERVER <ldapua-server-name>
[ WITH DROP ALL REFERENCES ] [ WITH SUSPEND ]
```

Parameters

- **WITH DROP ALL REFERENCES –** allows the removal of an LDAP server configuration object from service that has a reference in a login policy.
- **WITH SUSPEND –** allows an LDAP server configuration object to be dropped even if in a READY or ACTIVE state.

Examples

- **Example 1 –** assuming that references to the LDAP server configuration object have been removed from all login policies, the following two sets of commands are equivalent. Using the WITH DROP ALL REFERENCES and WITH SUSPEND parameters eliminates the need to execute an **ALTER LDAP SERVER** statement before the **DROP LDAP SERVER** statement:

```
DROP LDAP SERVER ldapserver1 WITH DROP ALL REFERENCES WITH SUSPEND

is equivalent to

ALTER LDAP SERVER ldapserver1 WITH SUSPEND
DROP LDAP SERVER ldapserver1 WITH DROP ALL REFERENCES
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY LDAP SERVER system privilege.

DROP LOGIN POLICY Statement

Removes a login policy from the database.

Syntax

DROP LOGIN POLICY *policy-name*

Examples

- **Example 1 –** Create and then delete the `Test11` login policy:

```
CREATE LOGIN POLICY Test11;
DROP LOGIN POLICY Test11 ;
```

Usage

A **DROP LOGIN POLICY** statement fails if you attempt to drop a policy that is assigned to a user. You can use either the **ALTER USER** statement to change the policy assignment of the user or **DROP USER** to drop the user.

Permissions

Requires the MANAGE ANY LOGIN POLICY system privilege.

See also

- *ALTER USER Statement* on page 68
- *CREATE LOGIN POLICY Statement* on page 149
- *DROP USER Statement* on page 268
- *ALTER LOGIN POLICY Statement* on page 24

DROP LOGICAL SERVER Statement

Drops a user-defined logical server.

Syntax

DROP LOGICAL SERVER *logical-server-name*
 [**WITH STOP SERVER**]

Applies to

Multiplex only.

Examples

- **Example 1 –** drops a user-defined logical server *ls1*.

```
DROP LOGICAL SERVER ls1
```

Usage

SAP Sybase IQ performs the following catalog changes internally when dropping a logical server:

- Drops all membership definitions of the logical server.
- Drops its logical server assignment from each login policy that has an explicit assignment to the subject logical server. If it is the only logical server assigned to the login policy, SAP Sybase IQ sets the logical server assignment for the login policy to NONE.
- Removes the logical server entry from ISYSIQ.LOGICALSERVER.

WITH STOP SERVER automatically shuts down all servers in the logical server when the `TEMP_DATA_IN_SHARED_TEMP` option is changed directly or indirectly.

This statement enforces consistent shared system temporary store settings across physical nodes shared by logical servers.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

DROP LS POLICY

Removes a logical server policy from the multiplex.

Syntax

DROP LS POLICY *ls-policy-name*

Applies to

Multiplex.

Examples

- **Example 1 –** Delete the `Test20` logical server policy:

```
DROP LS POLICY Test20
```

Usage

The *ls-policy-name* can be any policy name except ROOT and must refer to a policy not currently used for any logical server.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

DROP MULTIPLEX SERVER Statement

Deletes a server from the multiplex.

Syntax

DROP MULTIPLEX SERVER {*server-name*} [*drop_mpx_server_clause*]

Parameters

- **drop_mpx_server_clause –** { **WITH DROP MEMBERSHIP** | **WITH DROP LOGICAL SERVER** }

Applies to

Multiplex only.

Examples

- **Example 1 –**

```
DROP MULTIPLEX SERVER writer1
```

Usage

Shut down each multiplex server before dropping it. This statement automatically commits.

If not already stopped as recommended, the dropped server automatically shuts down after executing this statement.

Dropping the last secondary server converts the multiplex back to simplex. After dropping the last secondary server within the multiplex, the coordinator automatically shuts down. If required, it needs to be restarted.

Clause **WITH DROP MEMBERSHIP** – The **DROP MULTIPLEX SERVER** fails with an error, when one or more logical server memberships exist for the multiplex server being dropped. Use the **WITH DROP MEMBERSHIP** clause to drop the multiplex server along with all of its memberships.

Clause **WITH DROP LOGICAL SERVER** – When dropping the last secondary server, the **DROP MULTIPLEX SERVER** command fails, when there are one or more user-defined logical

servers. Use the **WITH DROP LOGICAL SERVER** clause to drop the last secondary server along with all user-defined logical servers.

Note: The **WITH DROP LOGICAL SERVER** clause is only valid when dropping the last secondary server. An error is reported otherwise.

Permissions

Requires the MANAGE MULTIPLEX system privilege.

DROP ROLE Statement

Removes a user-defined role from the database or converts a user-extended role to a regular user.

Syntax

```
DROP ROLE [ FROM USER ] role_name
[ WITH REVOKE ]
[ WITH DROP OBJECTS ]
```

Parameters

- **role_name –** must be the name of a role that already exists in the database.
- **FROM USER –** required to convert a user-extended role back to a regular user. The *role_name* must exist in the database.
- **WITH REVOKE –** required when dropping a standalone or user-extended role to which users have been granted the underlying system privileges of the role with either the WITH ADMIN OPTION or WITH NO ADMIN OPTION clause.
- **WITH DROP OBJECTS –** required when dropping a standalone or user-extended role that owns objects.

Examples

- **Example 1 –** converts a user-extended role named `Joe` that does not have its underlying system privileges granted to any user back to a regular user.

  ```
  DROP ROLE FROM USER Joe
  ```

- **Example 2 –** drops a user-extended role named `Jack` that does not have its underlying system privileges granted to any user from the database.

  ```
  DROP ROLE Jack
  ```

- **Example 3 –** converts a user-extended role named `Sam` that has underlying system privileges granted to users back to a regular role.

```
DROP ROLE FROM USER Sam
WITH REVOKE
```

- **Example 4 –** drops a standalone role named `Sales1` that does not own objects, nor has its underlying system privileges granted to any user from the database.

```
DROP ROLE Sales1
```

- **Example 5 –** drops a standalone role named `Sales2` that does not own objects, and has its underlying system privileges granted to users from the database.

```
DROP ROLE Sales2
WITH REVOKE
```

- **Example 6 –** converts a user-extended role named `Marketing1` that owns objects, but does not have its underlying system privileges granted to users back to a regular user.

```
DROP ROLE FROM USER Marketing1
WITH DROP OBJECTS
```

- **Example 7 –** drops a standalone role named `Marketing2` that owns objects, and has its underlying system privileges granted to users from the database.

```
DROP ROLE Marketing1
WITH REVOKE WITH DROP OBJECTS
```

Usage

A user-defined role can be dropped from the database or converted back to a regular user at any time as long as all dependent roles left meet the minimum required number of administrative users with active passwords.

Include the FROM USER clause when dropping a user-extended role to convert it back to act as a regular user rather than remove it from the database. The user retains any login privileges, system privileges, and roles granted to the user-extended role and becomes the owner of any objects owned by the user-extended role. Any users granted to the user-extended are immediately revoked.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

- Requires administrative rights over the role being dropped.
- If the role being dropped owns objects, none are in use by any user in any session at the time the DROP statement is executed.

DROP SEQUENCE statement

Drops a sequence. This statement applies to SAP Sybase IQ catalog store tables only.

Syntax

```
DROP SEQUENCE [ owner.] sequence-name
```

Remarks

If the named sequence cannot be located, an error message is returned. When you drop a sequence, all synonyms for the name of the sequence are dropped automatically by the database server.

Privileges

You must be the owner of the sequence, or have the DROP ANY SEQUENCE or DROP ANY OBJECT system privilege.

Side effects

None

Standards and compatibility

- **SQL/2008 –** Sequences comprise SQL/2008 optional language feature T176.

Example

The following example creates and then drops a sequence named Test:

```
CREATE SEQUENCE Test
START WITH 4
INCREMENT BY 2
NO MAXVALUE
NO CYCLE
CACHE 15;
DROP SEQUENCE Test;
```

DROP SERVER Statement

Drops a remote server from the SAP Sybase IQ system tables.

Syntax

```
DROP SERVER server-name
```

Examples

- **Example 1 –**

```
DROP SERVER ase_prod
```

Usage

Before **DROP SERVER** succeeds, you must drop all the proxy tables that have been defined for the remote server.

Side Effects

- Automatic commit

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

Requites the SERVER OPERATOR system privilege.

See also

- *CREATE SERVER Statement* on page 184

DROP SERVICE Statement

Deletes a Web service.

Syntax

DROP SERVICE *service-name*

Examples

- **Example 1 –** Drop a Web service named `tables`:

```
DROP SERVICE tables
```

Usage

DROP SERVICE deletes a Web service.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY WEB SERVICE system privilege.

See also

- *ALTER SERVICE Statement* on page 43
- *CREATE SERVICE Statement* on page 186

DROP SPATIAL REFERENCE SYSTEM Statement

Drops a spatial reference system.

Syntax

DROP SPATIAL REFERENCE SYSTEM [**IF EXISTS**] *name*

Usage

Use the **IF EXISTS** clause if you do not want an error returned when the **DROP SPATIAL REFERENCE SYSTEM** statement attempts to remove a spatial reference system that does not exist.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- MANAGE ANY SPATIAL OBJECT system privilege.
- DROP ANY OBJECT system privilege.
- You own the spatial references system

DROP SPATIAL UNIT OF MEASURE Statement

Drops a spatial unit of measurement.

Syntax

DROP SPATIAL UNIT OF MEASURE [IF EXISTS] *identifier*

Examples

- **Example –** The following example drops a fictitious spatial unit of measure named Test.

```
DROP SPATIAL UNIT OF MEASURE Test;
```

Usage

Use the IF EXISTS clause if you do not want an error returned when the DROP SPATIAL UNIT OF MEASURE statement attempts to remove a spatial unit of measure that does not exist.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- MANAGE ANY SPATIAL OBJECT system privilege.
- DROP ANY OBJECT system privilege.
- You own the spatial unit of measure

DROP STATEMENT Statement [ESQL]

Frees statement resources.

Syntax

```
DROP STATEMENT [ owner.]statement-name
```

Parameters

- **statement-name –** identifier or host-variable

Examples

- **Example 1 –**

```
EXEC SQL DROP STATEMENT S1;
EXEC SQL DROP STATEMENT :stmt;
```

Usage

DROP STATEMENT frees resources used by the named prepared statement. These resources are allocated by a successful **PREPARE** statement, and are normally not freed until the database connection is released.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported in Open Client/Open Server

Permissions

Must have prepared the statement.

See also

- *PREPARE Statement [ESQL]* on page 366

DROP TEXT CONFIGURATION Statement

Drops a text configuration object.

Note: This statement requires the Unstructured Data Analytics (IQ_UDA) license.

Syntax

DROP TEXT CONFIGURATION [*owner.*]*text-config-name*

Examples

- **Example 1 –** Create and drop the `mytextconfig` text configuration object:

```
CREATE TEXT CONFIGURATION mytextconfig FROM default_char;
```

```
DROP TEXT CONFIGURATION mytextconfig;
```

Usage

Use **DROP TEXT CONFIGURATION** to drop a text configuration object.

Attempting to drop a text configuration object with dependent **TEXT** indexes results in an error. You must drop the dependent **TEXT** indexes before dropping the text configuration object.

Text configuration objects are stored in the **ISYSTEXTCONFIG** system table.

Side Effects:

- Automatic commit.

Permissions

Text configuration object owned by self – None required.

Table configuration object owned by any user – Requires one of:

- DROP ANY TEXT CONFIGURATION system privilege.
- DROP ANY OBJECT system privilege.

DROP TEXT INDEX Statement

Removes a **TEXT** index from the database.

Note: This statement requires the Unstructured Data Analytics (IQ_UDA) license.

Syntax

```
DROP TEXT INDEX text-index-name
   ON [ owner ] table-name
```

Examples

- **Example 1 –** Create and drop the `TextIdx` **TEXT** index:

```
CREATE TEXT INDEX TextIdx ON Customers ( Street );
DROP TEXT INDEX TextIdx ON Customers;
```

Usage

Use **DROP TEXT INDEX** to remove a **TEXT** index from the database.

ON clause – specifies the table on which the **TEXT** index is built.

You must drop dependent **TEXT** indexes before you can drop a text configuration object.

Side Effects:

- Automatic commit.

Permissions

Requires one of:

- DROP ANY INDEX system privilege.
- DROP ANY OBJECT system privilege.
- REFERENCE privilege on the table being indexed.
- You own the underlying table.

DROP TRIGGER statement

Removes a trigger from the database.

Syntax

```
DROP TRIGGER [ IF EXISTS ] [ owner.] [ table-name.]trigger-name
```

Remarks

Use the IF EXISTS clause if you do not want an error returned when the DROP statement attempts to remove a database object that does not exist.

Privileges

To drop a trigger on a table, one of the following must be true:

- You are the owner of the table.
- You have ALTER privilege on the table.
- You have the ALTER ANY TABLE system privilege.
- You have the ALTER ANY OBJECT system privilege.

To drop a trigger on a view owned by someone else, you must have either the ALTER ANY VIEW or ALTER ANY OBJECT system privilege.

Side effects

Automatic commit. Clears the **Results** tab in the **Results** pane in Interactive SQL.

Standards and compatibility

- **SQL/2008 –** DROP TRIGGER comprises part of optional SQL language feature T211, "Basic trigger capability", of the SQL/2008 standard. The IF EXISTS clause is a vendor extension.

Example

This example creates, and then drops, a trigger called emp_upper_postal_code to ensure that postal codes are in upper case before updating the Employees table. If the trigger does not exist, an error is returned.

```
CREATE TRIGGER emp_upper_postal_code
BEFORE UPDATE OF PostalCode
ON GROUPO.Employees
REFERENCING NEW AS new_emp
FOR EACH ROW
WHEN ( ISNUMERIC( new_emp.PostalCode ) = 0 )
BEGIN
   -- Ensure postal code is uppercase (employee might be
   -- in Canada where postal codes contain letters)
   SET new_emp.PostalCode = UPPER(new_emp.PostalCode)
END;
DROP TRIGGER MyTrigger;
```

DROP USER Statement

Removes a user.

Syntax

DROP USER *user-name*

Parameters

- **user-name –** name of the user to remove.

Examples

- **Example 1 –** drops the user `SQLTester` from the database:

```
DROP USER SQLTester
```

Standards

- SQL – ISO/ANSI SQL compliant.
- Sybase – Not supported by Adaptive Server Enterprise.

Permissions

Requires the MANAGE ANY USER system privilege.

Note: When dropping a user, any objects owned by this user and any permissions granted by this user will be removed.

See also

- *CREATE LOGIN POLICY Statement* on page 149
- *CREATE USER Statement* on page 223
- *DROP LOGIN POLICY Statement* on page 256
- *ALTER LOGIN POLICY Statement* on page 24
- *GRANT ROLE Statement* on page 305
- *GRANT System Privilege Statement* on page 312
- *REVOKE System Privilege Statement* on page 399
- *REVOKE ROLE Statement* on page 395

DROP VARIABLE Statement

Eliminates a SQL variable.

Syntax

```
DROP VARIABLE identifier
```

Usage

DROP VARIABLE eliminates a SQL variable that was created using the **CREATE VARIABLE** statement. Variables are automatically eliminated when the database connection is released. Variables are often used for large objects, so eliminating them after use or setting them to NULL can free up significant resources (primarily disk space).

Use the **IF EXISTS** clause if you do not want an error returned when the **DROP** statement attempts to remove a database object that does not exist.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

None

See also

- *CREATE VARIABLE Statement* on page 225
- *SET Statement [ESQL]* on page 417

EXECUTE Statement [ESQL]

Executes a SQL statement.

Syntax

Syntax 1

```
EXECUTE statement-name
... [ { USING DESCRIPTOR sqlda-name | USING host-variable-list } ]
... [ { INTO DESCRIPTOR into-sqlda-name | INTO into-host-variable-
list ]
... [ ARRAY :nnn } ]
```

Syntax 2

```
EXECUTE IMMEDIATE statement
```

Parameters

- **statement-name –** identifier or host-variable
- **sqlda-name –** identifier
- **into-sqlda-name –** identifier
- **statement –** string or host-variable

Examples

- **Example 1 –** Execute a **DELETE**:

```
EXEC SQL EXECUTE IMMEDIATE
'DELETE FROM Employees WHERE EmployeeID = 105';
```

- **Example 2 –** Execute a prepared **DELETE** statement:

```
EXEC SQL PREPARE del_stmt FROM
'DELETE FROM Employees WHERE EmployeeID = :a';
EXEC SQL EXECUTE del_stmt USING :employee_number;
```

- **Example 3 –** Execute a prepared query:

```
EXEC SQL PREPARE sel1 FROM
'SELECT Surname FROM Employees WHERE EmployeeID = :a';
EXEC SQL EXECUTE sel1 USING :employee_number INTO :emp_lname;
```

Usage

Syntax 1 executes the named dynamic statement that was previously prepared. If the dynamic statement contains host variable placeholders which supply information for the request (bind variables), then either the *sqlda-name* must specify a C variable which is a pointer to an SQLDA containing enough descriptors for all bind variables occurring in the statement, or the bind variables must be supplied in the *host-variable-list*.

The optional **ARRAY** clause can be used with prepared **INSERT** statements, to allow wide inserts, which insert more than one row at a time and which might improve performance. The value **nnn** is the number of rows to be inserted. The SQLDA must contain nnn * (columns per row) variables. The first row is placed in SQLDA variables 0 to (columns per row)-1, and so on.

OUTPUT from a **SELECT** statement or a **CALL** statement is put either into the variables in the variable list or into the program data areas described by the named SQLDA. The correspondence is one to one from the **OUTPUT** (selection list or parameters) to either the host variable list or the SQLDA descriptor array.

If **EXECUTE** is used with an **INSERT** statement, the inserted row is returned in the second descriptor. For example, when using autoincrement primary keys that generate primary-key values, **EXECUTE** provides a mechanism to refetch the row immediately and determine the primary-key value assigned to the row.

Syntax 2 is a short form to **PREPARE** and **EXECUTE** a statement that does not contain bind variables or output. The SQL statement contained in the string or host variable is immediately executed and is dropped on completion.

EXECUTE can be used for any SQL statement that can be prepared. Cursors are used for **SELECT** statements or **CALL** statements that return many rows from the database.

Note: You cannot reference a Table UDF in an **EXECUTE** statement.

After successful execution of an **INSERT**, **UPDATE**, or **DELETE** statement, the *sqlerrd[2]* field of the SQLCA (SQLCOUNT) is filled in with the number of rows affected by the operation.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported in Open Client/Open Server.

Permissions

Permissions are checked on the statement being executed.

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *PREPARE Statement [ESQL]* on page 366

EXECUTE Statement [T-SQL]

Invokes a procedure, as an Adaptive Server Enterprise-compatible alternative to the **CALL** statement.

Syntax

```
EXECUTE [ @return_status = ] [owner.]procedure_name
... { [ @parameter-name = ] expression
| [ @parameter-name = ] @variable [ output ] } ,...
```

Examples

- **Example 1 –** Create the procedure `p1`:

```
CREATE PROCEDURE p1( @var INTEGER = 54 )
AS
PRINT 'on input @var = %1! ', @var
DECLARE @intvar integer
SELECT @intvar=123
SELECT @var=@intvar
PRINT 'on exit @var = %1!', @var;
```

- Execute the procedure, supplying the input value of 23 for the parameter. If you are connected from an Open Client application, **PRINT** messages are displayed on the client window. If you are connected from an ODBC or Embedded SQL application, messages display on the database server window.

```
EXECUTE p1 23
```

- An alternative way of executing the procedure, which is useful if there are several parameters:

```
EXECUTE p1 @var = 23
```

- Execute the procedure, using the default value for the parameter:

```
EXECUTE p1
```

- Execute the procedure and store the return value in a variable for checking return status:

```
EXECUTE @status = p1 23
```

Usage

EXECUTE executes a stored procedure, optionally supplying procedure parameters and retrieving output values and return status information.

EXECUTE is implemented for Transact-SQL compatibility, but can be used in either Transact-SQL or SAP Sybase IQ batches and procedures.

Note: You cannot reference a Table UDF in an **EXECUTE** statement.

Permissions

Must be the owner of the procedure, have EXECUTE permission for the procedure, or have the EXECUTE ANY PROCEDURE system privilege.

See also

- *CALL Statement* on page 86

EXECUTE IMMEDIATE Statement [ESQL] [SP]

Enables dynamically constructed statements to be executed from within a procedure.

Syntax

Syntax 1

```
EXECUTE IMMEDIATE [ execute-option ] string-expression
```

```
execute-option:
WITH QUOTES [ ON | OFF ]
```

```
| WITH ESCAPES { ON | OFF }
| WITH RESULT SET { ON | OFF }
```

Syntax 2

```
EXECUTE ( string-expression )
```

Examples

- **Example 1 –** This procedure creates a table, where the table name is supplied as a parameter to the procedure. The full **EXECUTE IMMEDIATE** statement must be on a single line.

```
CREATE PROCEDURE CreateTableProc(
            IN tablename char(30)
            )
BEGIN
 EXECUTE IMMEDIATE 'CREATE TABLE ' || tablename ||
' ( column1 INT PRIMARY KEY)'
END;
```

  Call the procedure and create table `mytable`:

```
CALL CreateTableProc( 'mytable' )
```

Usage

EXECUTE IMMEDIATE extends the range of statements that can be executed from within procedures. It lets you execute dynamically prepared statements, such as statements that are constructed using the parameters passed in to a procedure.

Literal strings in the statement must be enclosed in single quotes, and must differ from any existing statement name in a **PREPARE** or **EXECUTE IMMEDIATE** statement. The statement must be on a single line.

Only global variables can be referenced in a statement executed by **EXECUTE IMMEDIATE**.

Only syntax 2 can be used inside Transact-SQL stored procedures.

WITH QUOTES—When you specify **WITH QUOTES** or **WITH QUOTES ON**, any double quotes in the string expression are assumed to delimit an identifier. When you do not specify **WITH QUOTES**, or specify **WITH QUOTES OFF**, the treatment of double quotes in the string expression depends on the current setting of the `QUOTED_IDENTIFIER` option.

WITH QUOTES is useful when an object name that is passed into the stored procedure is used to construct the statement that is to be executed, but the name might require double quotes and the procedure might be called when `QUOTED_IDENTIFIER` is set to OFF.

See *QUOTED_IDENTIFIER Option [TSQL]*.

WITH ESCAPES—**WITH ESCAPES OFF** causes any escape sequences (such as **\n**, **\x**, or ****) in the string expression to be ignored. For example, two consecutive backslashes remain as two backslashes, rather than being converted to a single backslash. The default setting is equivalent to WITH ESCAPES ON.

You can use **WITH ESCAPES OFF** for easier execution of dynamically constructed statements referencing file names that contain backslashes.

In some contexts, escape sequences in the *string-expression* are transformed before **EXECUTE IMMEDIATE** is executed. For example, compound statements are parsed before being executed, and escape sequences are transformed during this parsing, regardless of the **WITH ESCAPES** setting. In these contexts, **WITH ESCAPES OFF** prevents further translations from occurring. For example:

```
BEGIN
DECLARE String1 LONG VARCHAR;
DECLARE String2 LONG VARCHAR;
EXECUTE IMMEDIATE
 'SET String1 = ''One backslash: \\\\ ''';
 EXECUTE IMMEDIATE WITH ESCAPES OFF
 'SET String2 = ''Two backslashes: \\\\ ''';
 SELECT String1, String2
END
```

WITH RESULT SET—You can have an **EXECUTE IMMEDIATE** statement return a result set by specifying **WITH RESULT SET ON**. With this clause, the containing procedure is marked as returning a result set. If you do not include this clause, an error is reported when the procedure is called if the statement does not produce a result set.

Note: The default option is **WITH RESULT SET OFF**, meaning that no result set is produced when the statement is executed.

Side Effects

None. However, if the statement is a data definition statement with an automatic commit as a side effect, then that commit does take place.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported in Open Client/Open Server.

Permissions

None. The statement is executed with the permissions of the owner of the procedure, not with the permissions of the user who calls the procedure.

See also

- *BEGIN … END Statement* on page 81
- *CREATE PROCEDURE Statement* on page 159
- *QUOTED_IDENTIFIER Option [TSQL]* on page 605

EXIT Statement [Interactive SQL]

Leaves Interactive SQL.

Syntax

```
{ EXIT | QUIT | BYE } [ return-code ]
```

Parameters

- ***return-code*** **–** *number* | *connection-variable*

Examples

- **Example 1 –** Set the Interactive SQL return value to 1 if there are any rows in table T, or to 0 if T contains no rows.

```
CREATE VARIABLE rowCount INT;
CREATE VARIABLE retcode INT;
SELECT COUNT(*) INTO rowCount FROM T;
IF( rowCount > 0 ) THEN
    SET retcode = 1;
ELSE
    SET retcode = 0;
END IF;
EXIT retcode;
```

Note: You cannot write the following the statement, because **EXIT** is an Interactive SQL statement (not a SQL statement), and you cannot include any Interactive SQL statement in other SQL block statements:

```
CREATE VARIABLE rowCount INT;
SELECT COUNT(*) INTO rowCount FROM T;
IF( rowCount > 0 ) THEN
    EXIT 1;     //  <-- not allowed
ELSE
    EXIT 0;     //  <-- not allowed
END IF;
```

Usage

Closes the Interactive SQL window, if you are running Interactive SQL as a windowed program, or terminates Interactive SQL altogether when run in command-prompt (batch) mode. In both cases, the database connection is also closed. Before closing the database connection, Interactive SQL automatically executes a **COMMIT** statement, if the `COMMIT_ON_EXIT` option is set to ON. If this option is set to OFF, Interactive SQL performs an implicit **ROLLBACK**. By default, the `COMMIT_ON_EXIT` option is set to ON.

The optional return code can be used in batch files to indicate success or failure of the commands in an Interactive SQL command file. The default return code is 0.

Side Effects

- Automatically performs a commit, if option `COMMIT_ON_EXIT` is set to ON (the default); otherwise this statement performs an implicit rollback.
- On Windows operating systems, the optional return value is available as ERRORLEVEL.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable by Adaptive Server Enterprise.

Permissions

None

See also

- *SET OPTION Statement* on page 422

FETCH Statement [ESQL] [SP]

Repositions a cursor and gets data from it.

Syntax

```
FETCH
{ NEXT | PRIOR | FIRST | LAST
| ABSOLUTE row-count | RELATIVE row-count }
... cursor-name
... { [ INTO host-variable-list ]
| USING DESCRIPTOR sqlda-name
| INTO variable-list }
... [ PURGE ] [ BLOCK n ] [ ARRAY fetch-count ]
... INTO variable-list
... IQ CACHE row-count
```

These clauses are for use in Embedded SQL only:

- **USING DESCRIPTOR** *sqlda-name*
- **INTO** *host-variable-list*
- **PURGE**
- **BLOCK** *n*
- **ARRAY** *fetch-count*
- Use of *host-variable* in *cursor-name* and *row-count*

Parameters

- **cursor-name –** identifier or host variable
- **sqlda-name –** identifier
- **host-variable-list –** may contain indicator variables
- **row-count –** number or host variable
- **fetch-count –** integer or host variable

Examples

- **Example 1 –** Embedded SQL example:

```
EXEC SQL DECLARE cur_employee CURSOR FOR
SELECT EmployeeID, Surname FROM Employees;
EXEC SQL OPEN cur_employee;
EXEC SQL FETCH cur_employee
INTO :emp_number, :emp_name:indicator;
```

- **Example 2 –** Procedure example:

```
BEGIN
    DECLARE cur_employee CURSOR FOR
        SELECT Surname
        FROM Employees;
    DECLARE name CHAR(40) ;
    OPEN cur_employee;
    LOOP
        FETCH NEXT cur_employee into name ;
         .
         .
         .
    END LOOP
    CLOSE cur_employee;
END
```

Usage

FETCH retrieves one row from the named cursor.

The **ARRAY** clause allows wide fetches, which retrieve more than one row at a time, and which might improve performance.

The cursor must have been previously opened.

One row from the result of **SELECT** is put into the variables in the variable list. The correspondence from the select list to the host variable list is one-to-one.

One or more rows from the result of **SELECT** are put either into the variables in the variable list or into the program data areas described by the named SQLDA. In either case, the correspondence from the select list to either the host variable list or the SQLDA descriptor array is one-to-one.

The **INTO** clause is optional. If it is not specified, then **FETCH** positions the cursor only (see the following paragraphs).

An optional positional parameter can be specified that allows the cursor to be moved before a row is fetched. The default is **NEXT**, which causes the cursor to be advanced one row before the row is fetched. **PRIOR** causes the cursor to be backed up one row before fetching.

RELATIVE positioning is used to move the cursor by a specified number of rows in either direction before fetching. A positive number indicates moving forward and a negative number indicates moving backwards. Thus, a **NEXT** is equivalent to **RELATIVE 1** and **PRIOR** is equivalent to **RELATIVE -1**. **RELATIVE 0** retrieves the same row as the last fetch statement on this cursor.

The **ABSOLUTE** positioning parameter is used to go to a particular row. A zero indicates the position before the first row.

A one (1) indicates the first row, and so on. Negative numbers are used to specify an absolute position from the end of the cursor. A negative one (-1) indicates the last row of the cursor. **FIRST** is a short form for **ABSOLUTE 1**. **LAST** is a short form for **ABSOLUTE -1**.

Note: SAP Sybase IQ handles the **FIRST**, **LAST**, **ABSOLUTE**, and negative **RELATIVE** options less efficiently than some other DBMS products, so there is a performance impact when using them.

OPEN initially positions the cursor before the first row.

A cursor declared **FOR READ ONLY** sees the version of table(s) on which the cursor is declared when the cursor is opened, not the version of table(s) at the time of the first **FETCH**

If the fetch includes a positioning parameter and the position is outside the allowable cursor positions, then the SQLE_NOTFOUND warning is issued.

The **IQ CACHE** clause specifies the maximum number of rows buffered in the FIFO queue. If you do not specify a value for **IQ CACHE**, the value of the `CURSOR_WINDOW_ROWS` database option is used. The default setting of `CURSOR_WINDOW_ROWS` is 200.

DECLARE CURSOR must appear before **FETCH** in the C source code, and the **OPEN** statement must be executed before **FETCH**. If a host variable is being used for the cursor name, then the **DECLARE** statement actually generates code and thus must be executed before **FETCH**.

In the multiuser environment, rows can be fetched by the client more than one at a time. This is referred to as block fetching or multirow fetching. The first fetch causes several rows to be sent back from the server. The client buffers these rows and subsequent fetches are retrieved from these buffers without a new request to the server.

The **BLOCK** clause gives the client and server a hint as to how many rows may be fetched by the application. The special value of 0 means the request is sent to the server and a single row is returned (no row blocking).

The **PURGE** clause causes the client to flush its buffers of all rows and then send the fetch request to the server. This fetch request may return a block of rows.

If the SQLSTATE_NOTFOUND warning is returned on the fetch, then the *sqlerrd[2]* field of the SQLCA (SQLCOUNT) contains the number of rows that the attempted fetch exceeded the allowable cursor positions. (A cursor can be on a row, before the first row or after the last row.) The value is 0 if the row was not found but the position is valid, for example, executing **FETCH RELATIVE 1** when positioned on the last row of a cursor. The value is positive if the attempted fetch was further beyond the end of the cursor, and negative if the attempted fetch was further before the beginning of the cursor.

After successful execution of the **FETCH** statement, the *sqlerrd[1]* field of the SQLCA (SQLIOCOUNT) is incremented by the number of input/output operations required to perform the fetch. This field is actually incremented on every database statement.

To use wide fetches in Embedded SQL, include the **FETCH** statement in your code:

```
EXEC SQL FETCH . . . ARRAY nnn
```

where *ARRAY nnn* is the last item of the **FETCH** statement. The fetch count *nnn* can be a host variable. The SQLDA must contain nnn * (columns per row) variables. The first row is placed in SQLDA variables 0 to (columns per row)-1, and so on.

The server returns in SQLCOUNT the number of records fetched and always returns a SQLCOUNT greater than zero unless there is an error. Older versions of the server only return a single row and the SQLCOUNT is set to zero. Thus a SQLCOUNT of zero with no error condition indicates one valid row has been fetched.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported in Adaptive Server Enterprise.

Permissions

The cursor must be opened and the user must have SELECT permission on the tables referenced in the declaration of the cursor.

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *OPEN Statement [ESQL] [SP]* on page 360
- *PREPARE Statement [ESQL]* on page 366
- *CURSOR_WINDOW_ROWS Option* on page 498

FOR Statement

Repeats the execution of a statement list once for each row in a cursor.

Syntax

```
[ statement-label: ]
FOR for-loop-name AS cursor-name [ cursor-type ] CURSOR
   { FOR statement
... [ { FOR { UPDATE cursor-concurrency | FOR READ ONLY } ]
    | USING variable-name }
  DO statement-list
END FOR [ statement-label ]
```

Parameters

- **cursor-type – NO SCROLL** | **DYNAMIC SCROLL** | **SCROLL** | **INSENSITIVE** | **SENSITIVE**
- **cursor-concurrency – BY** { **VALUES** | **TIMESTAMP** | **LOCK**]
- **variable-name –** *identifier*

Examples

- **Example 1 –** This code fragment illustrates the use of the **FOR** loop:

```
FOR names AS curs CURSOR FOR
SELECT Surname
FROM Employees
DO
    CALL search_for_name( Surname );
END FOR;
```

Usage

FOR is a control statement that lets you execute a list of SQL statements once for each row in a cursor.

The **FOR** statement is equivalent to a compound statement with a **DECLARE** for the cursor and a **DECLARE** of a variable for each column in the result set of the cursor, followed by a loop that fetches one row from the cursor into the local variables and executes *statement-list* once for each row in the cursor.

The name and data type of the local variables that are declared are derived from the *statement* used in the cursor. With a **SELECT** statement, the data type is the data type of the expressions in the select list. The names are the select list item aliases where they exist; otherwise, they are the names of the columns. Any select list item that is not a simple column reference must have an alias. With a **CALL** statement, the names and data types are taken from the **RESULT** clause in the procedure definition.

The **LEAVE** statement can be used to resume execution at the first statement after the **END FOR**. If the ending *statement-label* is specified, it must match the beginning *statement-label*.

Cursor types:

- **NO SCROLL clause –** A cursor declared **NO SCROLL** is restricted to moving forward through the result set using **FETCH NEXT** and **FETCH RELATIVE 0** seek operations.

  As rows cannot be returned to once the cursor leaves the row, there are no sensitivity restrictions on the cursor. When a NO SCROLL cursor is requested, the database server supplies the most efficient kind of cursor, which is an asensitive cursor.
- **DYNAMIC SCROLL clause – DYNAMIC SCROLL** is the default cursor type. **DYNAMIC SCROLL** cursors can use all formats of the **FETCH** statement.

  When a **DYNAMIC SCROLL** cursor is requested, the database server supplies an asensitive cursor. When using cursors there is always a trade-off between efficiency and consistency. Asensitive cursors provide efficient performance at the expense of consistency.
- **SCROLL clause –** A cursor declared **SCROLL** can use all formats of the **FETCH** statement. When a **SCROLL** cursor is requested, the database server supplies a value-sensitive cursor.

  The database server must execute value-sensitive cursors in such a way that result set membership is guaranteed. **DYNAMIC SCROLL** cursors are more efficient and should be used unless the consistent behavior of **SCROLL** cursors is required.
- **INSENSITIVE clause –** A cursor declared **INSENSITIVE** has its values and membership fixed over its lifetime. The result set of the **SELECT** statement is materialized when the cursor is opened. **FETCHING** from an **INSENSITIVE** cursor does not see the effect of any other **INSERT**, **UPDATE**, **MERGE**, **PUT**, or **DELETE** statement from any connection, including the connection that opened the cursor.
- **SENSITIVE clause –** A cursor declared **SENSITIVE** is sensitive to changes to membership or values of the result set.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported in Adaptive Server Enterprise.

Permissions

None

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *FETCH Statement [ESQL] [SP]* on page 276
- *LEAVE Statement* on page 333

- *LOOP Statement* on page 355

FOR JSON Statement

You can execute a SQL query against your database and return the results as a JSON document by using the FOR JSON clause in a SELECT statement.

JavaScript Object Notation (JSON) is a language-independent, text-based data interchange format developed for the serialization of JavaScript data. JSON also represents two structured types: objects and arrays. For more details about JSON format, see *http://www.json.org*

Syntax

```
...For JSON mode
mode :
RAW | AUTO | EXPLICIT
```

Parameters

The mode controls the format of the JSON that is generated:

- **RAW –** returns query results as a flattened JSON representation. Although this mode is more verbose, it can be easier to parse.
- **AUTO –** returns query results as nested JSON objects, based on query joins.
- **EXPLICIT –** allows you to specify how column data is represented. You can specify columns as simple values, objects, or nested objects to produce uniform or heterogeneous arrays.

Examples

- **Example 1 –** Use JSON RAW to return employee information from the Employees table:

```
SELECT
   emp.EmployeeID,
   so.CustomerID,
   so.Region
FROM Employees AS emp KEY JOIN SalesOrders AS so WHERE
emp.EmployeeID <= 195
ORDER BY 1
FOR JSON RAW;
```

- **Example 2 –** Unlike the results returned if using FOR JSON AUTO, which would hierarchically nest the results, using FOR JSON RAW returns a flattened result set:

```
[
   { "EmployeeID" : 129, "CustomerID" : 107, "Region" :
"Eastern" },
   { "EmployeeID" : 129, "CustomerID" : 119, "Region" :
"Western" },
   ...
   { "EmployeeID" : 129, "CustomerID" : 131, "Region" :
```

```
"Eastern" },
   { "EmployeeID" " 195, "CustomerID" : 176, "Region" : "Eastern" }
]
```

- **Example 3 –** Unlike FOR JSON RAW, using FOR JSON AUTO returns a nested hierarchy of data, where an `emp` or Employee object is composed of an `so` or SalesOrders object that contains an array of CustomerID data:

```
[
   { "emp":
     { "EmployeeID" : 129,
     "so" : [
       { "CustomerID" : 107 , "Region" : "Eastern" },
       ...
       { "CustomerID" : 131 , "Region" : "Eastern" }
     ]
     }
   },
   { "emp" :
     { "EmployeeID" : 195,
     "so" : [
       { "CustomerID" : 109 , "Region" : "Eastern" },
       ...
       { "CustomerID" : 176 , "Region" : "Eastern" }
            ]
     }
   }
]
```

- **Example 4 –** Use FOR JSON EXPLICIT to return employee information from the Employees table:

```
SELECT
   1                AS tag,
   NULL             AS parent,
   emp.EmployeeID   AS [!1!EmployeeID],
   so.CustomerID    AS [!1!CustomerID],
   so.Region        AS [!1!Region]
FROM Employees AS emp KEY JOIN SalesOrders AS so WHERE
emp.EmployeeID <= 195
ORDER BY 3
FOR JSON EXPLICIT;
```

Returns result identical to that of the FOR JSON RAW example:

```
 [
   { "EmployeeID" : 129, "CustomerID" : 107, "Region" :
"Eastern" },
   { "EmployeeID" : 129, "CustomerID" : 119, "Region" :
"Western" },
   ...
   { "EmployeeID" : 129, "CustomerID" : 131, "Region" :
"Eastern" },
   { "EmployeeID" " 195, "CustomerID" : 176, "Region" : "Eastern" }
]
```

- **Example 5 –** Returns a result that is similar to the result of the FOR JSON AUTO example:

```
 SELECT
      1              AS tag,
      NULL           AS parent,
      emp.EmployeeID AS [emp!1!EmployeeID],
      null           AS [so!2!CustomerID],
      null           AS [!2!Region]
FROM Employees as emp where emp.EmployeeID <= 195
UNION ALL
SELECT
      2,
      1,
      emp.EmployeeID,
      so.CustomerID,
      so.Region
FROM Employees as emp KEY JOIN SalesOrders as so where
emp.EmployeeID <= 195
ORDER BY 3, 1
FOR JSON EXPLICIT;
```

The above query returns the following result:

```
 [
  {"emp": [{"EmployeeID":102}]},
  {"emp":[{"EmployeeID":105}]},
  {"emp":
    [{"EmployeeID":129,
      "so":[
        {"CustomerID":101,"Region":"Eastern"},
        ...
        {"CustomerID":205,"Region":"Eastern"}
      ]
    }]
  },
  {"emp":[{"EmployeeID":148}]},
  {"emp":[{"EmployeeID":160}]},
  {"emp":[{"EmployeeID":184}]},
  {"emp":[{"EmployeeID":191}]},
  {"emp":
    [{"EmployeeID":195,
      "so":[
        {"CustomerID":101,"Region":"Eastern"},
    ...
        {"CustomerID":209,"Region":"Western"}
      ]
    }]
  }
]
```

Besides the ordering of the arrays and the inclusion of employees with no sales orders, the format above differs from the FOR JSON AUTO results only in that emp is an array of structures. In FOR JSON AUTO it is understood that emp only has a single object. FOR JSON EXPLICIT uses an array encapsulation that supports aggregation.

The following example removes the emp encapsulation and returns Region as a value. This example demonstrates how the FOR JSON EXPLICIT mode provides a granular formatting control to produce something between the RAW and AUTO modes.

```
 SELECT
      1              AS tag,
      NULL           AS parent,
     emp.EmployeeID AS [!1!EmployeeID],          // remove "emp"
encapsulation
      null           AS [so!2!id],                  // change
"CustomerID" to just "id"
     null          AS [!2!]                     // stipulate that
region should be emitted as a value
FROM Employees AS emp WHERE emp.EmployeeID <= 195
UNION ALL
SELECT
      2,
      1,
      emp.EmployeeID,
      so.CustomerID,
      so.Region
FROM Employees as emp KEY JOIN SalesOrders AS so WHERE
emp.EmployeeID <= 195
ORDER BY 3, 1
FOR JSON EXPLICIT;
```

In the query result, so is no longer an array of objects, but is now a two-dimensional array:

```
 [
  {"EmployeeID":102},{"EmployeeID":105},{"EmployeeID":129,
    "so":[
      [{"id":101},"Eastern"],
      ...
      [{"id":205},"Eastern"]
    ]
  },
  {"EmployeeID":148},
  {"EmployeeID":160},
  {"EmployeeID":184},
  {"EmployeeID":191},
  {"EmployeeID":195,
    "so":[
      [{"id":101},"Eastern"],
      ...
      [{"id":209},"Western"]
    ]
  }
]
```

The following example is similar to using FOR JSON RAW, but employeeID, CustomerID, and Region are output as values, not name/value pairs:

```
 SELECT
      1               AS tag,
      NULL            AS parent,
```

```
      emp.EmployeeID,    // no alias directives
      so.CustomerID,
      so.Region
FROM Employees AS emp KEY JOIN SalesOrders AS so WHERE
emp.EmployeeID <= 195
ORDER BY 3
FOR JSON EXPLICIT;
```

The query returns the following result, where a two-dimensional array composed of EmployeeID, CustomerID, and Region is produced:

```
 [
  [129,107,"Eastern"],
  ...
  [195,176,"Eastern"]
]
```

Usage

The FOR JSON clause can be used in any SELECT statement, including subqueries, queries with a GROUP BY clause or aggregate functions, and view definitions. Using the FOR JSON clause represents relational data as a JSON array composed of arrays, objects, and scalar elements.

The **RAW**clause is the recommended method for retrieving query results as JSON objects as it is the easiest method to parse and understand.

Use the **AUTO** clause in a query when you want the result set to show the hierarchical relationship between the JSON objects.

The **EXPLICIT** clause uses a column alias to provide a detailed format specification. If an alias is not present, then the given column is output as a value. An alias must be present to express a value (or object) within a nested structure. You must name the first two columns in the select-list `tag` and `parent`. A union of multiple queries can return nested JSON output by specifying the tag and parent relationship within each query.

The format for the alias directive is

```
[encapsulating_object!tag!name!qualifier]
```

where:

- **! –** delimits directive criteria.
- **encapsulating_object –** emits an encapsulating (array) object for the select-list item.
- **tag –** defines an identifier for the column used in subsequent queries. It also establishes nesting criteria (relative to its parent).
- **name –** assigns a name for the (name/value pair) object.
- **qualifier –** can be either `element` (the default), or `hide` to obfuscate the element from the result set.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

None

FORWARD TO Statement

Sends native syntax to a remote server.

Syntax

Syntax 1

```
FORWARD TO server-name { sql-statement }
```

Syntax 2

```
FORWARD TO [ server-name ]
```

Examples

- **Example 1 –** A passthrough session with the remote server `ase_prod`:

```
FORWARD TO aseprod
SELECT * from titles
SELECT * from authors
FORWARD TO
```

Usage

FORWARD TO enables users to specify the server to which a passthrough connection is required. The statement can be used:

- To send a statement to a remote server (Syntax 1)
- To place SAP Sybase IQ into passthrough mode for sending a series of statements to a remote server (Syntax 2)

When establishing a connection to *server-name* on behalf of the user, the server uses:

- A remote login alias set using **CREATE EXTERNLOGIN**
- If a remote login alias is not set up, the name and password used to communicate with SAP Sybase IQ

If the connection cannot be made to the server specified, the reason is contained in a message returned to the user.

After statements are passed to the requested server, any results are converted into a form that can be recognized by the client program.

server-name is the name of the remote server.

sql-statement is a command in the native syntax of the remote server. The command or group of commands is enclosed in curly braces ({}) or single quotes.

When you specify a *server_name*, but do not specify a statement in the **FORWARD TO** query, your session enters passthrough mode, and all subsequent queries are passed directly to the remote server. To turn passthrough mode off, issue **FORWARD TO** without a *server_name* specification.

Note: The **FORWARD TO** statement is a server directive and cannot be used in stored procedures, triggers, events, or batches.

Side Effects

- The remote connection is set to AUTOCOMMIT (unchained) mode for the duration of the **FORWARD TO** session. Any work that was pending prior to the **FORWARD TO** statement is automatically committed.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *CREATE EXTERNLOGIN Statement* on page 127
- *CREATE SERVER Statement* on page 184

FROM Clause

Specifies the database tables or views involved in a **SELECT** statement.

Syntax

```
...FROM table-expression [,...]
```

Parameters

- **table-expression –**

```
table-name
 | view-name
 | procedure-name
 | common-table-expression
```

```
| (subquery) [[  AS]  derived-table-name [column_name, ...)]]
| derived-table
| join-expression
| ( table-expression, ... )
| openstring-expression
| apply-expression
| contains-expression
| dml-derived-table
```

- **table-name –**

```
[ userid.]table-name ]
    [ [ AS ] correlation-name ]
    [ FORCE INDEX ( index-name ) ]
```

- **view-name –**

```
[ userid.]view-name [ [ AS ] correlation-name ]
```

- **procedure-name –**

```
[  owner, ]  procedure-name ([  parameter, ...])
    [  WITH( column-name datatype,)]
    [ [   AS] correlation-name ]
```

- **parameter –**

```
scalar-expression | table-parameter
```

- **table-parameter –**

```
 TABLE(select-statement) [ OVER (table-parameter-over)]
```

- **table-parameter-over –**

```
[ PARTITION BY {ANY| NONE| table-expression } ] [ ORDER BY
{ expression | integer } [ ASC | DESC ] [, …] ]
```

- **derived-table –**

```
( select-statement )
    [ AS ] correlation-name [ ( column-name, ... ) ]
```

- **join-expression –**

```
table-expression join-operator table-expression
    [ ON join-condition ]
```

- **join-operator –**

```
[ KEY | NATURAL ] [ join-type ] JOIN
    | CROSS JOIN
```

- **join-type –**

```
INNER
    | LEFT [ OUTER ]
    | RIGHT [ OUTER ]
    | FULL [ OUTER ]
```

- **openstring-expression –**

```
OPENSTRING ( { FILE | VALUE } string-expression )
    WITH ( rowset-schema )
    [ OPTION ( scan-option ...  ) ]
    [ AS ] correlation-name
```

- **apply-expression –**

```
table-expression { CROSS | OUTER } APPLY table-expression
```

- **contains-expression –**

```
{ table-name  | view-name } CONTAINS ( column-name [,...],
contains-query ) [ [ AS ] score-correlation-name ]
```

- **rowset-schema –**

```
column-schema-list
    | TABLE [owner.]table-name [ ( column-list ) ]
```

- **column-schema-list –**

```
{ column-name user-or-base-type |  filler( ) } [ , ... ]
```

- **column-list –**

```
{ column-name | filler( ) } [ , ... ]
```

- **scan-option –**

```
BYTE ORDER MARK { ON | OFF }
    | COMMENTS INTRODUCED BY comment-prefix
    | DELIMITED BY string
    | ENCODING encoding
    | ESCAPE CHARACTER character
    | ESCAPES { ON | OFF }
    | FORMAT { TEXT  | BCP  }
    | HEXADECIMAL { ON | OFF }
    | QUOTE string
    | QUOTES { ON | OFF }
    | ROW DELIMITED BY string
    | SKIP integer
    | STRIP { ON | OFF | LTRIM | RTRIM | BOTH }
```

- **contains-query –**

```
string
```

- **dml-derived-table –**

```
( dml-statement  ) REFERENCING ( [ table-version-names  | NONE ] )
```

- **dml-statement –**

```
insert-statement
    delete-statement
    update-statement
    merge-statement
```

- **table-version-names –**

```
OLD [ AS ] correlation-name [ FINAL [ AS ] correlation-name ]
    | FINAL [ AS ] correlation-name
```

Examples

- **Example 1 –** These are valid **FROM** clauses:

```
...
FROM Employees
...
...
FROM Employees NATURAL JOIN Departments
...
...
FROM Customers
KEY JOIN SalesOrders
KEY JOIN SalesOrderItems
KEY JOIN Products
...
```

- **Example 2 –** This query illustrates how to use derived tables in a query:

```
SELECT Surname, GivenName, number_of_orders
FROM Customers JOIN
     ( SELECT CustomerID, count(*)
       FROM SalesOrders
        GROUP BY CustomerID )
     AS sales_order_counts ( CustomerID,
                             number_of_orders )
ON ( Customers.ID = sales_order_counts.cust_id )
WHERE number_of_orders > 3
```

Usage

The **SELECT** statement requires a table list to specify which tables are used by the statement.

Note: Although this description refers to tables, it also applies to views unless otherwise noted.

The **FROM** table list creates a result set consisting of all the columns from all the tables specified. Initially, all combinations of rows in the component tables are in the result set, and the number of combinations is usually reduced by join conditions and/or **WHERE** conditions.

- **SCALAR –** *scalar-parameter* are any objects of a valid SQL datatype.
- **TABLE –** A **TABLE** parameter can be specified using a table, view or common *table-expression* name which are treated as new instance of this object if the object is also used outside the **TABLE** parameter.

  This query illustrates a valid **FROM** clause where the two references to the same table T are treated as two different instances of the same table T.

```
SELECT * FROM T, my_proc(TABLE(SELECT T.Z, T.X FROM T)
OVER(PARTITION BY T.Z));
```

  Table Parameterized Function (TPF) Example—This query illustrates a valid **FROM** clause.

```
SELECT * FROM R, SELECT * FROM my_udf(1);
SELECT * FROM my_tpf(1, TABLE(SELECT c1, c2 FROM t))
   (my_proc(R.X, TABLE T OVER PARTITION BY T.X)) AS XX;
```

If a subquery is used to define the **TABLE** parameter, then the following restrictions must hold:

- The **TABLE** parameter must be of type **IN**.
- **PARTITION BY** or **ORDER BY** clauses must refer to the columns of the derived table and outer references. An expression in the *expression-list* can be an integer *K* which refers to the Kth column of the **TABLE** input parameter.

Note: A Table UDF can only be referenced in a **FROM** clause of a SQL statement.

- **PARTITION BY –** The **PARTITION BY** clause logically specifies how the invocation of the function will be performed by the execution engine. The execution engine must invoke the function for each partition and the function must process a whole partition in each invocation.

  PARTITION BY also specifies how the input data must be partitioned such that each invocation of the function will process exactly one partition of data. The function must be invoked the number of times equal to the number of partitions. For TPF, the parallelism characteristics are established through dynamic negotiation between the server and the UDF at the runtime. If the TPF can be executed in parallel, for *N* input partitions, the function can be instantiated *M* times, with *M <=N*. Each instantiation of the function can be invoked more than once, each invocation consuming exactly one partition.

  Note: The execution engine can invoke the function in any order of the partitions and the function is assumed to return the same result sets regardless of the partitions order. Partitions cannot be split among two invocations of the function.

  You can specify only one **TABLE** input parameter for **PARTITION BY** *expression-list* or **PARTITION BY ANY** clause. For all other **TABLE** input parameters you must specify, explicit or implicit **PARTITION BY NONE** clause.
- **ORDER BY –** The **ORDER BY** clause specifies that the input data in each partition is expected to be sorted by *expression-list* by the execution engine. The UDF expects each partition to have this physical property. If only one partition exists, the whole input data is ordered based on the **ORDER BY** specification. **ORDER BY** clause can be specified for any of the **TABLE** input parameters with **PARTITION BY NONE** or without **PARTITION BY** clause.
- **Joins –** The *join-type* keywords are:

Table 8. FROM clause join-type keywords

join-type keyword	Description
CROSS JOIN	Returns the Cartesian product (cross product) of the two source tables

join-type keyword	Description
NATURAL JOIN	Compares for equality all corresponding columns with the same names in two tables (a special case equijoin; columns are of same length and data type)
KEY JOIN	Restricts foreign-key values in the first table to be equal to the primary-key values in the second table
INNER JOIN	Discards all rows from the result table that do not have corresponding rows in both tables
LEFT OUTER JOIN	Preserves unmatched rows from the left table, but discards unmatched rows from the right table
RIGHT OUTER JOIN	Preserves unmatched rows from the right table, but discards unmatched rows from the left table
FULL OUTER JOIN	Retains unmatched rows from both the left and the right tables

Do not mix comma-style joins and keyword-style joins in the **FROM** clause. The same query can be written two ways, each using one of the join styles. The ANSI syntax keyword style join is preferable.

This query uses a comma-style join:

```
SELECT *
  FROM Products pr, SalesOrders so, SalesOrderItems si
  WHERE pr.ProductID = so.ProductID
    AND pr.ProductID = si.ProductID;
```

The same query can use the preferable keyword-style join:

```
SELECT *
  FROM Products pr INNER JOIN SalesOrders so
    ON (pr.ProductID = so.ProductID)
  INNER JOIN SalesOrderItems si
    ON (pr.ProductID = si.ProductID);
```

The **ON** clause filters the data of inner, left, right, and full joins. Cross joins do not have an **ON** clause. In an inner join, the **ON** clause is equivalent to a **WHERE** clause. In outer joins, however, the **ON** and **WHERE** clauses are different. The **ON** clause in an outer join filters the rows of a cross product and then includes in the result the unmatched rows extended with nulls. The **WHERE** clause then eliminates rows from both the matched and unmatched rows produced by the outer join. You must take care to ensure that unmatched rows you want are not eliminated by the predicates in the **WHERE** clause.

You cannot use subqueries inside an outer join **ON** clause.

Tables owned by a different user can be qualified by specifying the *userid*. Tables owned by roles to which the current user belongs are found by default without specifying the user ID.

The correlation name is used to give a temporary name to the table for this SQL statement only. This is useful when referencing columns that must be qualified by a table name but the table name is long and cumbersome to type. The correlation name is also necessary to distinguish between table instances when referencing the same table more than once in the same query. If no correlation name is specified, then the table name is used as the correlation name for the current statement.

If the same correlation name is used twice for the same table in a table expression, that table is treated as if it were only listed once. For example, in:

```
SELECT *
FROM SalesOrders
KEY JOIN SalesOrderItems,
SalesOrders
KEY JOIN Employees
```

The two instances of the `SalesOrders` table are treated as one instance that is equivalent to:

```
SELECT *
FROM SalesOrderItems
KEY JOIN SalesOrders
KEY JOIN Employees
```

By contrast, the following is treated as two instances of the `Person` table, with different correlation names HUSBAND and WIFE.

```
SELECT *
FROM Person HUSBAND, Person WIFE
```

You can supply a **SELECT** statement instead of one or more tables or views in the **FROM** clause, letting you use groups on groups, or joins with groups, without creating a view. This use of **SELECT** statements is called derived tables.

Join columns require like data types for optimal performance.

- **Performance Considerations –** Depending on the query, SAP Sybase IQ allows between 16 and 64 tables in the **FROM** clause with the optimizer turned on; however, performance might suffer if you have more than 16 to 18 tables in the **FROM** clause in very complex queries.

Note: If you omit the **FROM** clause, or if all tables in the query are in the `SYSTEM` dbspace, the query is processed by SQL Anywhere instead of SAP Sybase IQ and might behave differently, especially with respect to syntactic and semantic restrictions and the effects of option settings.

If you have a query that does not require a **FROM** clause, you can force the query to be processed by SAP Sybase IQ by adding the clause **FROM iq_dummy**, where `iq_dummy` is a one-row, one-column table that you create in your database.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The **JOIN** clause is not supported in some versions of Adaptive Server Enterprise. Instead, you must use the **WHERE** clause to build joins.

Permissions

Must be connected to the database.

See also

- *DELETE Statement* on page 241
- *SELECT Statement* on page 407

GET DESCRIPTOR Statement [ESQL]

Retrieves information about variables within a descriptor area, or retrieves actual data from a variable in a descriptor area.

Syntax

```
GET DESCRIPTOR descriptor-name
 { ...hostvar = COUNT } | VALUE n assignment [,…] }
```

Parameters

- **assignment –** *hostvar* = { **TYPE** | **LENGTH** | **PRECISION** | **SCALE** | **DATA** | **INDICATOR** | **NAME** | **NULLABLE** | **RETURNED_LENGTH** }

Examples

- **Example 1 –** For an example, see *ALLOCATE DESCRIPTOR Statement [ESQL]*.

Usage

The value *n* specifies the variable in the descriptor area about which information is retrieved.

Type checking is performed when doing **GET DESCRIPTOR ... DATA** to ensure that the host variable and the descriptor variable have the same data type. `LONG VARCHAR` and `LONG BINARY` are not supported by **GET DESCRIPTOR ... DATA**.

If an error occurs, it is returned in the SQLCA.

Standards

- SQL—ISO/ANSI SQL compliant.

- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *ALLOCATE DESCRIPTOR Statement [ESQL]* on page 5
- *DEALLOCATE DESCRIPTOR Statement [ESQL]* on page 230
- *SET DESCRIPTOR Statement [ESQL]* on page 421

GOTO Statement [T-SQL]

Branches to a labeled statement.

Syntax

```
label:
GOTO label
```

Examples

- **Example 1 –** This Transact-SQL batch prints the message "yes" on the server window four times:

```
declare @count smallint
select @count = 1
restart:
    print 'yes'
    select @count = @count + 1
    while @count <=4
     goto restart
```

Usage

Any statement in a Transact-SQL procedure or batch can be labeled. The label name is a valid identifier followed by a colon. In the **GOTO** statement, the colon is not used.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Adaptive Server Enterprise supports the GOTO statement.

Permissions

None

GRANT CHANGE PASSWORD Statement

Allows users to manage passwords for other users and administer the CHANGE PASSWORD system privilege.

A user can be granted the ability to mange the password of any user in the database (**ANY**) or only specific users (*target_users_list*) or members of specific roles (**ANY WITH ROLES** *target_roles_list*). Administrative rights to the CHANGE PASSWORD system privilege can only be granted when using the **ANY** clause.

Syntax

```
GRANT CHANGE PASSWORD ( target_user_list | ANY | ANY WITH ROLES
target_role_list  )
TO userID [,...]
[ WITH ADMIN [ONLY] OPTION | WITH NO ADMIN OPTION]
```

Parameters

- **target_user_list –** users the grantee has the potential to impersonate. The list must consist of existing users or user-extended roles with login passwords. Separate the userIDs in the list with commas.
- **ANY –** all database users with login passwords become potential target users to manage passwords for each grantee.
- **ANY WITH ROLES *target_role_list* –** list of target roles for each grantee. Any users who are granted any of the target roles become potential target users for each grantee. The *target_role_list* must consist of existing roles and the users who are granted said roles must consist of database users with login passwords. Use commas to separate multiple userIDs.
- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.
- **WITH ADMIN OPTION –** (valid with the **ANY** clause only) The user can both manage passwords and grant the CHANGE PASSWORD system privilege to another user.
- **WITH ADMIN ONLY OPTION –** (valid with the **ANY** clause only) The user can grant the CHANGE PASSWORD system privilege to another user, but cannot manage passwords of other users.
- **WITH NO ADMIN OPTION –** the user can manage passwords, but cannot grant the CHANGE PASSWORD system privilege to another user.

Examples

- **Example 1 –** grants *Sally* and *Laurel* the ability to mange the password of *Bob*, *Sam*, and *Peter*.

```
GRANT CHANGE PASSWORD (Bob, Sam, Peter) TO (Sally, Laurel)
```

- **Example 2 –** grants *Mary* the right to grant the CHANGE PASSWORD system privilege to any user in the database. However, since the system privilege is granted with the WITH ADMIN ONLY OPTION clause, `Mary` cannot manage the password of any other user.

  ```
  GRANT CHANGE PASSWORD (ANY) TO Mary WITH ADMIN ONLY OPTION
  ```

- **Example 3 –** grants *Steve* and *Joe* the ability to manage the password of any member of *Role1* or *Role2*.

  ```
  GRANT CHANGE PASSWORD (ANY WITH ROLES Role1, Role2) TO Steve, Joe
  ```

Usage

If no clause is specified, **ANY** is used by default.

If no administrative clause is specified in the grant statement, the WITH NO ADMIN OPTION clause is used.

By default, the CHANGE PASSWORD system privilege is granted to the SYS_AUTH_SA_ROLE compatibility role with the WITH NO ADMIN OPTION clause and to the SYS_AUTH_SSO_ROLE compatibility role with the ADMIN ONLY OPTION clause, if they exist.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

- Requires the CHANGE PASSWORD system privilege granted with administrative rights.
- Each target user specified (target_users_list) is an existing user or user-extended role with a login password.
- Each target role specified (target_roles_list) must be an existing user-extended or user-defined role.

See also

- *ALTER USER Statement* on page 68
- *REVOKE CHANGE PASSWORD Statement* on page 388

GRANT CONNECT Statement

Grants CONNECT privilege to a user.

GRANT CONNECT can be used to create a new user or also be used by any user to change their own password.

Tip: Use the **CREATE USER** statement rather than the **GRANT CONNECT** statement to create users.

Syntax

```
GRANT CONNECT
 TO userID [,...]
 IDENTIFIED BY password [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Examples

- **Example 1 –** creates two new users for the database named `Laurel` and `Hardy`.

```
GRANT CONNECT TO Laurel, Hardy
IDENTIFIED BY Stan, Ollie
```

- **Example 2 –** creates user `Jane` with no password.

```
GRANT CONNECT TO Jane
```

- **Example 3 –** changes the password for `Bob` to `newpassword`.

```
GRANT CONNECT TO Bob IDENTIFIED BY newpassword
```

Usage

The same command can be used to both create a new user or change the password of an existing user. If you inadvertently enter the user ID of an existing user when you are trying to add a new user, you are actually changing the password of the existing user. You do not receive a warning because this behavior is considered normal.

The stored procedures **sp_addlogin** and **sp_adduser** can also be used to add users. These procedures display an error if you try to add an existing user ID.

Note: Use system procedures, not **GRANT** and **REVOKE**, to add and remove user IDs.

A user without a password cannot connect to the database. This is useful when you are creating groups and you do not want anyone to connect to the role user ID. To create a user without a password, do not include the IDENTIFIED BY clause.

When specifying a password, it must be a valid identifier Passwords have a maximum length of 255 bytes. If the VERIFY_PASSWORD_FUNCTION database option is set to a value other than the empty string, the **GRANT CONNECT TO** statement calls the function identified by the option value. The function returns NULL to indicate that the password conforms to rules. If the `VERIFY_PASSWORD_FUNCTION` option is set, you can specify only one *userid* and *password* with the **GRANT CONNECT** statement.

Invalid names for database user IDs and passwords include those that:

- Begin with white space or single or double quotes

- End with white space
- Contain semicolons

Standards

- SQL – Other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – The security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

- If you are creating a new user, you must have the MANAGE ANY USER system privilege.
- Any user can change his or her own password.
- If you are changing another user's password, you must have the CHANGE PASSWORD system privilege.

Note: If you are changing another user's password, the other user cannot be connected to the database.

See also

- *CREATE USER Statement* on page 223
- *REVOKE CONNECT Statement* on page 390

GRANT CREATE Statement

Grants CREATE privilege on a specified dbspace to the specified users and roles.

Syntax

```
GRANT CREATE
   ON dbspace_name
   TO userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Examples

- **Example 1 –** grants users `Lawrence` and `Swift` `CREATE` privilege on dbspace *DspHist*.

```
GRANT CREATE ON DspHist
TO LAWRENCE, SWIFT
```

- **Example 2 –** grants `CREATE` privilege on dbspace `DspHist` to users `Fiona` and `Ciaran`.

```
GRANT CREATE ON DspHist TO Fiona, Ciaran
```

Standards

- SQL – other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – the security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

Requires the MANAGE ANY DBSPACE system privilege.

See also

- *REVOKE CREATE Statement* on page 391

GRANT Object-Level Privilege Statement

Grants database object-level privileges to a user or role.

Syntax

```
GRANT object-level-privilege [, …]
 ON [ owner.]object-name
 TO userID [,...]
 [ WITH GRANT OPTION ]
```

```
object-level-privilege:
   ALL [ PRIVILEGES ]
 | ALTER
 | DELETE
 | INSERT
 | REFERENCES [ ( column-name [, …] ) ]
 | SELECT [ ( column-name [, …] ) ]
 | UPDATE [ ( column-name, … ) ]
 | LOAD
 | TRUNCATE
```

Parameters

- **userID –** must be the name of an existing user or immutable role. The list must consist of existing users with login passwords. Separate the userIDs in the list with commas.

Usage

Grants privileges on individual tables or views. You can list the table privileges together, or specify ALL to grant all privileges at once. If you specify the WITH GRANT OPTION clause, the named user ID is also given privileges to grant the same privileges to other user IDs.

- **ALL –** grants all privileges to users
- **ALTER –** users can alter this table with the **ALTER TABLE** statement. This privilege is not allowed for views.
- **DELETE –** users can delete rows from this table or view.
- **INSERT –** users can insert rows into the named table or view.
- **LOAD –** users can load data into the named table or view.

  These server switches may impact a user's ability to execute the LOAD command:

  - **-gl NONE –** no one can execute the LOAD or UNLOAD command on a table.
  - **-gl ALL –** users with ALTER ANY TABLE or LOAD ANY TABLE system privilege can execute LOAD command on any table. Table owners or users with ALTER or LOAD privilege on a given table can execute LOAD command on the table. Users with SELECT ANY TABLE system privilege or SELECT privilege on a given table can execute the UNLOAD command.
  - **-gl DBA –** users with ALTER ANY TABLE or LOAD ANY TABLE system privilege can execute the LOAD command on any table.
- **REFERENCES –** users can create indexes on the named tables, and foreign keys that reference the named tables. If column names are specified, then users can reference only those columns. REFERENCES privileges on columns cannot be granted for views, only for tables.
- **SELECT –** users can look at information in this view or table. If column names are specified, then the users can look at only those columns. SELECT permissions on columns cannot be granted for views, only for tables.
- **TRUNCATE –** users can truncate the named table or view.
- **UPDATE –** users can update rows in this view or table. If column names are specified, users can update only those columns. UPDATE privileges on columns cannot be granted for views, only for tables. To update a table, users must have both SELECT and UPDATE privilege on the table.

Standards

- SQL – Syntax is an entry-level feature.
- Sybase – Syntax is supported in Adaptive Server Enterprise.

Permissions

Requires one of:

- MANAGE ANY OBJECT PRIVILEGE system privilege
- You have been granted the specific object privilege with the WITH GRANT OPTION clause on the table.
- You own of the table.

See also

- *REVOKE Object-Level Privilege Statement* on page 392

GRANT EXECUTE Statement

Grants EXECUTE privilege on a procedure or user-defined function.

Syntax

```
GRANT EXECUTE
  ON [ owner.] {procedure-name | user-defined-function-name }
  TO userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

- SQL – syntax is a Persistent Stored Module feature.
- Sybase – the security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

Requires one of:

- MANAGE ANY OBJECT PRIVILEGE system privilege.
- You own the procedure.

See also

- *REVOKE EXECUTE Statement* on page 393

GRANT INTEGRATED LOGIN Statement

Grants INTEGRATED LOGIN privileges to a user.

Creates an explicit integrated login mapping between one or more Windows user profiles and an existing database user ID, allow a user who successfully log in to their local machine to connect to a database without having to provide a user ID or password.

Syntax

```
GRANT INTEGRATED LOGIN
  TO user_profile_name [, …]
  AS USER userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

- SQL – other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – the security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *REVOKE INTEGRATED LOGIN Statement* on page 393

GRANT KERBEROS LOGIN Statement

Grants KERBEROS LOGIN privileges to a user.

Creates a Kerberos-authenticated login mapping from one or more Kerberos principals to an existing database user ID. This allows a user who has successfully logged in to Kerberos (user who has a valid Kerberos ticket-granting ticket) to connect to a database without having to provide a user ID or password.

Syntax

```
GRANT KERBEROS LOGIN
  TO client-Kerberos-principal [, …]
  AS USER userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

- SQL – other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – the security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *REVOKE KERBEROS LOGIN Statement* on page 394

GRANT ROLE Statement

Grants roles to users or other roles, with or without administrative rights.

Syntax

```
GRANT ROLE role_name [, …]
  TO grantee [, …]
  [ {WITH NO ADMIN | WITH ADMIN [ ONLY ] } OPTION ]
 [ WITH NO SYSTEM PRIVILEGE INHERITANCE ]
```

```
role_name:
dbo†††
| diagnostics†††
| PUBLIC†††
| rs_systabgroup†††
| SA_DEBUG†††
| SYS†††
| SYS_AUTH_SA_ROLE
| SYS_AUTH_SSO_ROLE
| SYS_AUTH_DBA_ROLE††
| SYS_AUTH_RESOURCE_ROLE†
| SYS_AUTH_BACKUP_ROLE†
| SYS_AUTH_VALIDATE_ROLE†
| SYS_AUTH_WRITEFILE_ROLE
| SYS_AUTH_WRITEFILECLIENT_ROLE
```

```
| SYS_AUTH_READFILE_ROLE
| SYS_AUTH_READFILECLIENT_ROLE
| SYS_AUTH_PROFILE_ROLE
| SYS_AUTH_USER_ADMIN_ROLE
| SYS_AUTH_SPACE_ADMIN_ROLE
| SYS_AUTH_MULTIPLEX_ADMIN_ROLE
| SYS_AUTH_OPERATOR_ROLE
| SYS_AUTH_PERMS_ADMIN_ROLE
| SYS_REPLICATION_ADMIN_ROLE†††
| SYS_RUN_REPLICATION_ROLE†††
| SYS_SPATIAL_ADMIN_ROLE†††
| <user-defined role name>
```

- The WITH NO SYSTEM PRIVILEGE INHERITANCE clause can be used when granting select compatibility roles to other roles. It prevents automatic inheritance of the compatibility role's underlying system privileges by members of the role. When granted to user-extended roles, the WITH NO SYSTEM PRIVILEGE INHERITANCE clause applies to members of the role only. The user acting as a role automatically inherits the underlying system privileges regardless of the clause.
- The WITH NO ADMIN OPTION WITH NO SYSTEM PRIVILEGE INHERITANCE and WITH NO SYSTEM PRIVILEGE INHERITANCE clauses are semantically equivalent.
- †The WITH ADMIN OPTION or WITH ADMIN ONLY clauses can not be specified in combination with the WITH NO SYSTEM PRIVILEGE INHERITANCE clause when granting the SYS_AUTH_BACKUP_ROLE, SYS_AUTH_RESOURCE_ROLE, or SYS_AUTH_VALIDATE_ROLE roles.
- ††The WITH ADMIN OPTION clause can only be specified in combination with the WITH NO SYSTEM PRIVILEGE INHERITANCE clause when granting the SYS_AUTH_DBA_ROLE or SYS_RUN_REPLICATION_ROLE roles.
- †††The WITH ADMIN OPTION and WITH ADMIN ONLY OPTION clauses are not supported for system roles.

Parameters

- **role_name –** must already exist in the database. Separate multiple role names with commas.
- **grantee –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.
- **WITH NO ADMIN OPTION –** each *grantee* is granted the underlying system privileges of each *role_name*, but cannot grant *role_name* to another user.
- **WITH ADMIN ONLY OPTION –** each *userID* is granted administrative privileges over each *role_name*, but not the underlying system privileges of *role_name*.
- **WITH ADMIN OPTION –** each userID is granted the underlying system privileges of each *role_name*, along with the ability to grant *role_name* to another user.
- **WITH NO SYSTEM PRIVILEGE INHERITANCE –** the underlying system privileges of the granting role are not inherited by the members of the receiving role.

However, if the receiving role is a user-extended role, the underlying system privileges are granted to the extended user.

Note: Use of the WITH ADMIN OPTION or WITH ADMIN ONLY OPTION clause allows the grantee to grant or revoke the role, but does not allow the grantee to drop the role.

Examples

- **Example 1 –** grants `Sales_Role` to `Sally`, with administrative privileges, which means she can grant or revoke `Sales_Role` to other users as well as perform any authorized tasks granted by the role.

```
GRANT ROLE Sales_Role TO Sally WITH ADMIN OPTION
```

- **Example 2 –** grants the compatibility role SYS_AUTH_PROFILE_ROLE to the role `Sales_Admin` with no administrative rights. `Sales_Admin` is a standalone role and `Mary` and `Peter` have been granted `Sales_Admin`. Since SYS_AUTH_PROFILE_ROLE is an inheritable compatibility role, `Mary` and `Peter` are granted the underlying system privileges of `Sales_Role`. Since the role is granted with no administrative rights, they cannot grant or revoke the role.

```
GRANT ROLE SYS_AUTH_PROFILE_ROLE TO Sales_Role WITH NO ADMIN
OPTION
```

- **Example 3 –** grants the compatibility role SYS_AUTH_BACKUP_ROLE to `Tom` with no administrative rights. `Tom` is a user-extended role to which `Betty` and Laurel have been granted. Since `SYS_AUTH_BACKUP_ROLE` is a non-inheritable compatibility role, the underlying system privileges of the role are not granted to Betty and Laurel. However, since `Tom` is an extended user, the underlying system privileges are granted directly to `Tom`.

```
GRANT ROLE SYS_AUTH_BACKUP_ROLE TO Tom
WITH NO SYSTEM PRIVILEGE INHERITANCE
```

Usage

- By default, if no administrative clause is specified in the grant statement, each compatibility role is granted with these default administrative rights:

WITH ADMIN OPTION	WITH ADMIN ONLY OPTION	WITH NO ADMIN OPTION
SYS_AUTH_SA_ROLE SYS_AUTH_SSO_ROLE	SYS_AUTH_DBA_ROLE	SYS_AUTH_RESOURCE_ROLE SYS_AUTH_BACKUP_ROLE SYS_AUTH_VALIDATE_ROLE SYS_AUTH_WRITEFILE_ROLE SYS_AUTH_WRITEFILECLIENT_ROLE SYS_AUTH_READFILE_ROLE SYS_AUTH_READFILECLIENT_ROLE SYS_AUTH_PROFILE_ROLE SYS_AUTH_USER_ADMIN_ROLE SYS_AUTH_SPACE_ADMIN_ROLE SYS_AUTH_MULTIPLEX_ADMIN_ROLE SYS_AUTH_OPERATOR_ROLE SA_DEBUG SYS_RUN_REPLICATION_ROLE

- The SYS_AUTH_PERMS_ADMIN_ROLE role grants these underlying roles with these default administrative rights:

WITH ADMIN OPTION	WITH NO ADMIN OPTION
SYS_AUTH_BACKUP_ROLE	MANAGE ROLES
SYS_AUTH_OPERATOR_ROLE	MANAGE ANY OBJECT PRIVILEGE
SYS_AUTH_USER_ADMIN_ROLE	CHANGE PASSWORD
SYS_AUTH_SPACE_ADMIN_ROLE	
SYS_AUTH_MULTIPLEX_ADMIN_ROLE	
SYS_AUTH_RESOURCE_ROLE	
SYS_AUTH_VALIDATE_ROLE	
SYS_AUTH_PROFILE_ROLE	
SYS_AUTH_WRITEFILE_ROLE	
SYS_AUTH_WRITEFILECLIENT_ROLE	
SYS_AUTH_READFILE_ROLE	
SYS_AUTH_READFILECLIENT_ROLE	

Standards

- SQL – Other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – Syntax is supported in Adaptive Server Enterprise.

Permissions

- Requires MANAGE ROLES system privilege to grant these system roles:
  - dbo
  - diagnostics
  - PUBLIC
  - rs_systabgroup
  - SA_DEBUG SYS
  - SYS
  - SYS_REPLICATION_ADMIN_ROLE
  - SYS_RUN_REPLICATION_ROLE
  - SYS_SPATIAL_ADMIN_ROLE
- Requires administrative privilege over the role to grant these roles:
  - SYS_AUTH_SA_ROLE
  - SYS_AUTH_SSO_ROLE
  - SYS_AUTH_DBA_ROLE
  - SYS_AUTH_RESOURCE_ROLE
  - SYS_AUTH_BACKUP_ROLE

- SYS_AUTH_VALIDATE_ROLE
- SYS_AUTH_WRITEFILE_ROLE
- SYS_AUTH_WRITEFILECLIENT_ROLE
- SYS_AUTH_READFILE_ROLE
- SYS_AUTH_READFILECLIENT_ROLE
- SYS_AUTH_PROFILE_ROLE
- SYS_AUTH_USER_ADMIN_ROLE
- SYS_AUTH_SPACE_ADMIN_ROLE
- SYS_AUTH_MULTIPLEX_ADMIN_ROLE
- SYS_AUTH_OPERATOR_ROLE
- SYS_AUTH_PERMS_ADMIN_ROLE
- <user-defined role name>

See also

- *CREATE USER Statement* on page 223
- *REVOKE System Privilege Statement* on page 399
- *REVOKE ROLE Statement* on page 395
- *VERIFY_PASSWORD_FUNCTION Option* on page 647

GRANT SET USER Statement

Grants the ability for one user to impersonate another user and to administer the SET USER system privilege.

A user can be granted the ability to impersonate any user in the database (**ANY**) or only specific users (*target_users_list*) or members of specific roles (**ANY WITH ROLES** *target_roles_list*). Administrative rights to the SET USER system privilege can only be granted when using the **ANY** clause.

Syntax

```
GRANT SET USER ( target_usesr_list | ANY | ANY WITH ROLES
target_roles_list )
  TO userID [,...]
  [ WITH ADMIN [ONLY] OPTION | WITH NO ADMIN OPTION]
```

Parameters

- **target_users_list –** users the grantee has the potential to impersonate. The list must consist of existing users or user-extended roles with login passwords. Separate the userIDs in the list with commas.
- **ANY –** all database users with login passwords become potential target users for impersonation for each grantee.

- **ANY WITH ROLES *target_roles_list* –** list of target roles for each grantee. Any users who are granted any of the target roles become potential target users for each grantee. The *target_role_list* must consist of existing roles and the users who are granted said roles must consist of database users with login passwords. Use commas to separate multiple userIDs. There are two restrictions when using this method.
  - Only those users who have been granted a subset of the target_role_list can be impersonated by a grantee.
  - Any user being impersonated must have exactly the exact subset of target_role_list; no additional roles are allowed.
- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.
- **WITH ADMIN OPTION –** (valid in conjunction with the **ANY** clause only) The user can both issue the SETUSER command to impersonate another user and grant the SET USER system privilege to another user.
- **WITH ADMIN ONLY OPTION –** (valid in conjunction with the **ANY** clause only) The user can grant the SET USER system privilege to another user, but cannot issue the SETUSER command to impersonate another user.
- **WITH NO ADMIN OPTION –** the user can issue the SETUSER command to impersonate another user, but cannot grant the SET USER system privilege to another user.

Examples

- **Example 1 –** grants *Sally* and *Laurel* the ability to impersonate *Bob*, *Sam*, and *Peter*.

```
GRANT SET USER (Bob, Sam, Peter) TO (Sally, Laurel)
```

- **Example 2 –** grants *Mary* the right to grant the SET USER system privilege to any user in the database. However, since the system privilege is granted with the WITH ADMIN ONLY OPTION clause, `Mary` cannot impersonate any other user.

```
GRANT SET USER (ANY) TO Mary WITH ADMIN ONLY OPTION
```

- **Example 3 –** grants *Steve* and *Joe* the ability to impersonate any member of *Role1* or *Role2*.

```
GRANT SET USER (ANY WITH ROLES Role1, Role2) TO Steve, Joe
```

Usage

If no clause is specified, **ANY** is used by default.

If no administrative clause is specified in the grant statement, the WITH NO ADMIN OPTION clause is used.

If regranting the SET USER system privilege to a user, the effect of the regrant is cumulative.

By default, the SET USER system privilege is granted to the SYS_AUTH_SSO_ROLE compatibility role with the WITH NO ADMIN OPTION clause, if they exist.

The granting of the SET USER system privilege to a user only grants the potential to impersonate another user. Validation of the *at-least* criteria required to successfully impersonate another user does no occur until the **SETUSER** statement is issued.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

- Requires the SET USER system privilege granted with administrative rights.
- Each target user specified (target_users_list) is an existing user or user-extended role with a login password.
- Each target role specified (target_roles_list) must be an existing user-extended or user-defined role.

See also

- *REVOKE SET USER Statement* on page 397

GRANT System Privilege Statement

Grants specific system privileges to users, with or without administrative rights.

Syntax

```
GRANT system_privilege_name [, …]
  TO userID [, …]
  [ {WITH NO ADMIN | WITH ADMIN [ ONLY ] } OPTION ]
```

Parameters

- **system_privilege –** must be the name of an existing system privilege.
- **userID –** must be the name of an existing user or immutable role. The list must consist of existing users with login passwords. Separate multiple userIDs with commas.
- **WITH NO ADMIN OPTION –** the user can manage the system privilege, but cannot grant the system privilege to another user.
- **WITH ADMIN ONLY OPTION –** If the WITH ADMIN ONLY OPTION clause is used, each *userID* is granted administrative privileges over each *system_privilege*, but NOT the *system_privilege* itself.
- **WITH ADMIN OPTION –** each *userID* is granted administrative privileges over each *system_privilege* in addition to all underlying system privileges of *system_privilege*.

Examples

- **Example 1 –** grants the DROP CONNECTION system privilege to `Joe` with administrative privileges.

```
GRANT DROP CONNECTION TO Joe WITH ADMIN OPTION
```

- **Example 2 –** grants the CHECKPOINT system privilege to `Sally` with no administrative privileges.

```
GRANT CHECKPOINT TO Sally WITH NO ADMIN OPTION
```

- **Example 3 –** grants the MONITOR system privilege to `Jane` with administrative privileges only.

```
GRANT MONITOR TO Jane WITH ADMIN ONLY OPTION
```

Usage

By default, if no administrative clause is specified in the grant statement, the WITH NO ADMIN OPTION clause is used.

Standards

- SQL – Other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – Syntax is supported in Adaptive Server Enterprise.

Permissions

Requires administrative privilege over the system privilege being granted.

See also

- *CREATE USER Statement* on page 223
- *REVOKE System Privilege Statement* on page 399
- *REVOKE ROLE Statement* on page 395
- *VERIFY_PASSWORD_FUNCTION Option* on page 647

List of All System Privileges

A list of all system privileges.

System privileges control the rights of users to perform authorized database tasks.

The following is a list of available system privileges:

- ACCESS SERVER LS system privilege
- ALTER ANY INDEX system privilege
- ALTER ANY MATERIALIZED VIEW system privilege
- ALTER ANY OBJECT system privilege

- ALTER ANY OBJECT OWNER system privilege
- ALTER ANY PROCEDURE system privilege
- ALTER ANY SEQUENCE system privilege
- ALTER ANY TABLE system privilege
- ALTER ANY TEXT CONFIGURATION system privilege
- ALTER ANY TRIGGER system privilege
- ALTER ANY VIEW system privilege
- ALTER DATABASE system privilege
- ALTER DATATYPE system privilege
- BACKUP DATABASE system privilege
- CHANGE PASSWORD system privilege
- CHECKPOINT system privilege
- COMMENT ANY OBJECT system privilege
- CREATE ANY INDEX system privilege
- CREATE ANY MATERIALIZED VIEW system privilege
- CREATE ANY OBJECT system privilege
- CREATE ANY PROCEDURE system privilege
- CREATE ANY SEQUENCE system privilege
- CREATE ANY TABLE system privilege
- CREATE ANY TEXT CONFIGURATION system privilege
- CREATE ANY TRIGGER system privilege
- CREATE ANY VIEW system privilege
- CREATE DATATYPE system privilege
- CREATE EXTERNAL REFERENCE system privilege
- CREATE MATERIALIZED VIEW system privilege
- CREATE MESSAGE system privilege
- CREATE PROCEDURE system privilege
- CREATE PROXY TABLE system privilege
- CREATE TABLE system privilege
- CREATE TEXT CONFIGURATION system privilege
- CREATE VIEW system privilege
- DEBUG ANY PROCEDURE system privilege
- DELETE ANY TABLE system privilege
- DROP ANY INDEX system privilege
- DROP ANY MATERIALIZED VIEW system privilege
- DROP ANY OBJECT system privilege
- DROP ANY PROCEDURE system privilege
- DROP ANY SEQUENCE system privilege
- DROP ANY TABLE system privilege

- DROP ANY TEXT CONFIGURATION system privilege
- DROP ANY VIEW system privilege
- DROP CONNECTION system privilege
- DROP DATATYPE system privilege
- DROP MESSAGE system privilege
- EXECUTE ANY PROCEDURE system privilege
- LOAD ANY TABLE system privilege
- INSERT ANY TABLE system privilege
- MANAGE ANY DBSPACE system privilege
- MANAGE ANY EVENT system privilege
- MANAGE ANY EXTERNAL ENVIRONMENT system privilege
- MANAGE ANY EXTERNAL OBJECT system privilege
- MANAGE ANY LDAP SERVER system privilege
- MANAGE ANY LOGIN POLICY system privilege
- MANAGE ANY MIRROR SERVER system privilege
- MANAGE ANY OBJECT PRIVILEGES system privilege
- MANAGE ANY SPATIAL OBJECT system privilege
- MANAGE ANY STATISTICS system privilege
- MANAGE ANY USER system privilege
- MANAGE ANY WEB SERVICE system privilege
- MANAGE AUDITING system privilege
- MANAGE MULTIPLEX system privilege
- MANAGE PROFILING system privilege
- MANAGE REPLICATION system privilege
- MANAGE ROLES system privilege
- MONITOR system privilege
- READ CLIENT FILE system privilege
- READ FILE system privilege
- REORGANIZE ANY OBJECT system privilege
- SELECT ANY TABLE system privilege
- SERVER OPERATOR system privilege
- SET ANY PUBLIC OPTION system privilege
- SET ANY SECURITY OPTION system privilege
- SET ANY SYSTEM OPTION system privilege
- SET ANY USER DEFINED OPTION system privilege
- SET USER system privilege (granted with ADMIN ONLY clause)
- TRUNCATE ANY TABLE system privilege
- UPDATE ANY TABLE system privilege
- UPGRADE ROLE system privilege

- USE ANY SEQUENCE system privilege
- VALIDATE ANY OBJECT system privilege
- WRITE CLIENT FILE system privilege
- WRITE FILE system privilege

GRANT USAGE ON SEQUENCE Statement

Grants USAGE privilege on a specified sequence.

Syntax

```
GRANT USAGE ON SEQUENCE sequence-name
  TO userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

- SQL – syntax is a Persistent Stored Module feature.
- Sybase – the security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

Requires one of:

- MANAGE ANY OBJECT PRIVILEGE system privilege.
- You own the sequence.

IF Statement

Provides conditional execution of SQL statements.

Syntax

```
IF search-condition THEN statement-list
... [ ELSEIF search-condition THEN statement-list ]...
... [ ELSE statement-list ]
... END IF
```

Examples

- **Example 1 –** This procedure illustrates the use of the **IF** statement:

```
CREATE PROCEDURE TopCustomer (OUT TopCompany CHAR(35), OUT
TopValue INT)
BEGIN
    DECLARE err_notfound EXCEPTION
    FOR SQLSTATE '02000' ;
    DECLARE curThisCust CURSOR FOR
    SELECT CompanyName, CAST(     sum(SalesOrderItems.Quantity *
    Products.UnitPrice) AS INTEGER) VALUE
    FROM Customers
    LEFT OUTER JOIN SalesOrders
    LEFT OUTER JOIN SalesOrsderItems
    LEFT OUTER JOIN Product
    GROUP BY CompanyName ;


    DECLARE ThisValue INT ;
    DECLARE ThisCompany CHAR(35) ;
    SET TopValue = 0 ;
    OPEN curThisCust ;
    CustomerLoop:
    LOOP
        FETCH NEXT curThisCust
        INTO ThisCompany, ThisValue ;
        IF SQLSTATE = err_notfound THEN
            LEAVE CustomerLoop ;
        END IF ;
        IF ThisValue > TopValue THEN
            SET TopValue = ThisValue ;
            SET TopCompany = ThisCompany ;
        END IF ;
    END LOOP CustomerLoop ;
    CLOSE curThisCust ;
END
```

- **Example 2 –** This procedure illustrates the use of the **ELSEIF** statement:

```
BEGIN
 DECLARE X INT;
 SET X = 1;
 IF X = 1 THEN
  PRINT '1';
  ELSEIF X = 2 THEN
   PRINT '2';
  ELSE
   PRINT 'something else';
 ENDIF
END
```

Usage

The **IF** statement lets you conditionally execute the first list of SQL statements whose *search-condition* evaluates to TRUE.

If no *search-condition* evaluates to TRUE, and an **ELSE** clause exists, the *statement-list* in the **ELSE** clause is executed. If no *search-condition* evaluates to TRUE, and there is no **ELSE** clause, the expression returns a NULL value.

Execution resumes at the first statement after the **END IF**.

When comparing variables to the single value returned by a **SELECT** statement inside an **IF** statement, you must first assign the result of the **SELECT** to another variable.

Note: Do not confuse the syntax of the **IF** statement with that of the IF expression.

You cannot nest the **IF** statement.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The Transact-SQL **IF** statement has a slightly different syntax.

Permissions

None

See also

- *BEGIN … END Statement* on page 81

IF Statement [T-SQL]

Provides conditional execution of a Transact-SQL statement, as an alternative to the SAP Sybase IQ **IF** statement.

Syntax

```
 IF expression
... statement
... [ ELSE [ IF expression ] statement ]...
```

Examples

- **Example 1 –** Use of the Transact-SQL **IF** statement:

```
IF (SELECT max(id) FROM sysobjects) < 100
  RETURN
ELSE
  BEGIN
    PRINT 'These are the user-created objects'
    SELECT name, type, id
    FROM sysobjects
```

```
    WHERE id < 100
END
```

- **Example 2 –** Use of the Transact-SQL **ELSEIF** statement:

```
BEGIN
 DECLARE @X INT
 SET @X = 1
 IF @X = 1
  PRINT '1'
  ELSEIF @X = 2
   PRINT '2'
  ELSE
   PRINT 'something else'
END
```

Usage

The Transact-SQL **IF** conditional and the **ELSE** conditional each control the performance of only a single SQL statement or compound statement (between the keywords **BEGIN** and **END**).

In contrast to the SAP Sybase IQ **IF** statement, the Transact-SQL **IF** statement has no **THEN**. The Transact-SQL version also has no **ELSEIF** or **END IF** keywords.

When comparing variables to the single value returned by a **SELECT** statement inside an **IF** statement, you must first assign the result of the **SELECT** to another variable.

Note: You cannot nest the **IF** statement.

Standards

- SQL—Transact-SQL extension to ISO/ANSI SQL grammar.
- Sybase—Adaptive Server Enterprise supports the Transact-SQL **IF** statement.

Permissions

None

INCLUDE Statement [ESQL]

Includes a file into a source program to be scanned by the SQL source language preprocessor.

Syntax

INCLUDE *filename*

Parameters

- **filename –** identifier

Usage

The **INCLUDE** statement is very much like the C preprocessor **#include** directive.

However, the SQL preprocessor reads the given file, inserting its contents into the output C file. Thus, if an include file contains information that the SQL preprocessor requires, it should be included with the Embedded SQL **INCLUDE** statement.

Two file names are specially recognized: SQLCA and SQLDA. Any C program using Embedded SQL must contain this statement before any Embedded SQL statements:

```
EXEC SQL INCLUDE SQLCA;
```

This statement must appear at a position in the C program where static variable declarations are allowed. Many Embedded SQL statements require variables (invisible to the programmer) which are declared by the SQL preprocessor at the position of the SQLCA include statement. The SQLDA file must be included if any SQLDAs are used.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

INSERT Statement

Inserts a single row or a selection of rows, from elsewhere in the current database, into the table. This command can also insert a selection of rows from another database into the table.

Syntax

Syntax 1

```
INSERT [ INTO ] [ owner.]table-name [ ( column-name [, …] ) ]
   ... VALUES ( [ expression | DEFAULT,… ) ]
or
INSERT [ INTO ] [ owner.]table-name DEFAULT VALUES
```

Syntax 2

```
INSERT [ INTO ] [ owner.]table-name [ ( column-name [, …] ) ]
... insert-load-options insert-select-load-options
... select-statement
```

Syntax 3

```
INSERT [ INTO ] [ owner.]table-name[ ( column-name [, …] ) ]
... insert-load-options insert-select-load-options
LOCATION 'servername.dbname'
[ location-options ]
... { { select-statement } | 'select statement' }
```

Parameters

- **insert-load-options –**

```
[ LIMIT number-of-rows ]
  [ NOTIFY number-of-rows ]
  [ SKIP number-of-rows ]
```

- **insert-select-load-options –**

```
[ WORD SKIP number ]
  [ IGNORE CONSTRAINT constrainttype [, …] ]
  [ MESSAGE LOG 'string' ROW LOG 'string' [ ONLY LOG logwhat
[, …] ] ]
  [ LOG DELIMITED BY 'string' ]
```

- **constrainttype –**

```
{ CHECK integer
      | UNIQUE integer
      | NULL integer
      | FOREIGN KEY integer
      | DATA VALUE integer
      | ALL integer
   }
```

- **logwhat –**

```
{ CHECK
     | ALL
     | NULL
     | UNIQUE
     | DATA VALUE
     | FOREIGN KEY
     | WORD
   }
```

- **location-options –**

```
[ ENCRYPTED PASSWORD ]
  [ PACKETSIZE packet-size ]
  [ QUOTED_IDENTIFIER { ON | OFF } ]
  [ ISOLATION LEVEL { READ UNCOMMITTED | READ
COMMITTED | SERIALIZABLE } ]
```

Examples

- **Example 1 –** Add an Eastern Sales department to the database:

```
INSERT INTO Departments
(DepartmentID, DepartmentName, DepartmentHeadID)
VALUES (600, 'Eastern Sales', 501)
```

- **Example 2 –** Fill the table `dept_head` with the names of department heads and their departments:

```
INSERT INTO dept_head (name, dept)
  NOTIFY 20
  SELECT Surname || ' ' || GivenName
  AS name,
  dept_name
FROM Employees JOIN Departments
  ON EmployeeID= DepartmentHeadID
```

- **Example 3 –** Insert data from the `l_shipdate` and `l_orderkey` columns of the `lineitem` table from the SAP Sybase IQ database `iqdet` on the remote server `detroit` into the corresponding columns of the `lineitem` table in the current database:

```
INSERT INTO lineitem
  (l_shipdate, l_orderkey)
  LOCATION 'detroit.iqdet'
  PACKETSIZE 512
  ' SELECT l_shipdate, l_orderkey
FROM lineitem '
```

- **Example 4 –** The INSERT statement permits a list of values allowing several rows to be inserted at once.

```
INSERT into t1 values( 10, 20, 30 ), ( 11, 21, 31 ), ( 12, 22,
32 )
```

Usage

Syntax 1 allows the insertion of a single row with the specified expression values. If the list of column names is not specified, the values are inserted into the table columns in the order they were created (the same order as retrieved with **SELECT ***). The row is inserted into the table at an arbitrary position. (In relational databases, tables are not ordered.)

Syntax 2 allows the user to perform a mass insertion into a table using the results of a fully general **SELECT** statement. Insertions are done in an arbitrary order unless the **SELECT** statement contains an **ORDER BY** clause. The columns from the select list are matched ordinally with the columns specified in the column list, or sequentially in the order in which the columns were created.

Note: The **NUMBER(*)** function is useful for generating primary keys with Syntax 2 of the **INSERT** statement.

Syntax 3 **INSERT...LOCATION** is a variation of Syntax 2 that allows you to insert data from an Adaptive Server Enterprise or SAP Sybase IQ database. The *servername.dbname* specified in the **LOCATION** clause identifies the remote server and database for the table in the **FROM** clause. To use Syntax 3, the Adaptive Server Enterprise or SAP Sybase IQ remote server to

which you are connecting must exist in the SAP Sybase Open Client `interfaces` or `sql.ini` file on the local machine.

In queries using Syntax 3, you can insert a maximum of 2147483647 rows.

The **SELECT** statement can be delimited by either curly braces or straight single quotation marks.

Note: Curly braces represent the start and end of an escape sequence in the ODBC standard, and might generate errors in the context of ODBC or Sybase Control Center. The workaround is to use single quotes to escape the **SELECT** statement.

The local SAP Sybase IQ server connects to the server and database you specify in the **LOCATION** clause. The results from the queries on the remote tables are returned and the local server inserts the results in the current database. If you do not specify a server name in the **LOCATION** clause, SAP Sybase IQ ignores any database name you specify, since the only choice is the current database on the local server.

When SAP Sybase IQ connects to the remote server, **INSERT...LOCATION** uses the remote login for the user ID of the current connection, if a remote login has been created with **CREATE EXTERNLOGIN** and the remote server has been defined with a **CREATE SERVER** statement. If the remote server is not defined, or if a remote login has not been created for the user ID of the current connection, SAP Sybase IQ connects using the user ID and password of the current connection.

Note: If you rely on the user ID and password of the current connection, and a user changes the password, you must stop and restart the server before the new password takes effect on the remote server. Remote logins created with **CREATE EXTERNLOGIN** are unaffected by changes to the password for the default user ID.

Creating a remote login with the **CREATE EXTERNLOGIN** statement and defining a remote server with a **CREATE SERVER** statement sets up an external login and password for **INSERT...LOCATION** such that any user can use the login and password in any context. This avoids possible errors due to inaccessibility of the login or password, and is the recommended way to connect to a remote server.

For example, user `russid` connects to the SAP Sybase IQ database and executes this statement:

```
INSERT local_SQL_Types LOCATION 'ase1.ase1db'
{SELECT int_col FROM SQL_Types};
```

On server `ase1`, there exists user ID `ase1user` with password `sybase`. The owner of the table `SQL_Types` is `ase1user`. The remote server is defined on the IQ server as:

```
CREATE SERVER ase1 CLASS 'ASEJDBC'
USING 'system1:4100';
```

The external login is defined on the IQ server as:

```
CREATE EXTERNLOGIN russid TO ase1 REMOTE LOGIN ase1user IDENTIFIED BY
sybase;
```

INSERT...LOCATION connects to the remote server `ase1` using the user ID `ase1user` and the password `sybase` for user `russid`.

Use the **ENCRYPTED PASSWORD** parameter to specify the use of Open Client Library default password encryption when connecting to a remote server. If **ENCRYPTED PASSWORD** is specified and the remote server does not support Open Client Library default password encryption, an error is reported indicating that an invalid user ID or password was used.

When used as a remote server, SAP Sybase IQ supports TDS password encryption. The SAP Sybase IQ server accepts a connection with an encrypted password sent by the client. For information on connection properties to set for password encryption, see *Software Developer's Kit 15.5 > Open Client Client-Library/C Reference Manual > Client-Library Topics > Security features > Adaptive Server Enterprise security features > Security handshaking: encrypted password* for Open Server 15.5.

Note: Password encryption requires Open Client 15.0. TDS password encryption requires Open Client 15.0 ESD #7 or later.

To enable the SAP Sybase IQ server to accept a jConnect connection with an encrypted password, set the jConnect **ENCRYPT_PASSWORD** connection property to true.

The **PACKETSIZE** parameter specifies the TDS packet size in bytes. The default TDS packet size on most platforms is 512 bytes. If your application is receiving large amounts of text or bulk data across a network, then a larger packet size might significantly improve performance.

The value of *packet-size* must be a multiple of 512 either equal to the default network packet size or between the default network packet size and the maximum network packet size. The maximum network packet size and the default network packet size are multiples of 512 in the range 512 – 524288 bytes. The maximum network packet size is always greater than or equal to the default network packet size.

If **INSERT...LOCATION PACKETSIZE** *packet-size* is not specified or is specified as zero, then the default packet size value for the platform is used.

When **INSERT...LOCATION** is transferring data between an SAP Sybase IQ server and a remote SAP Sybase IQ or Adaptive Server Enterprise server, the value of the **INSERT...LOCATION** TDS **PACKETSIZE** parameter is always 512 bytes, even if you specify a different value for **PACKETSIZE**.

Note: If you specify an incorrect packet size (for example 933, which is not a multiple of 512), the connection attempt fails with an Open Client **ct_connect** “Connection failed” error. Any unsuccessful connection attempt returns a generic “Connection failed” message. The Adaptive Server Enterprise error log might contain more specific information about the cause of the connection failure.

Use the **QUOTED_IDENTIFIER** parameter to specify the setting of the QUOTED_IDENTIFIER option on the remote server. The default setting is 'OFF.' You set **QUOTED_IDENTIFIER** to 'ON' only if any of the identifiers in the **SELECT** statement are enclosed in double quotes, as in this example using 'c1':

```
INSERT INTO foo
LOCATION 'ase.database'
QUOTED_IDENTIFIER ON {select "c1" from xxx};
```

Use the **ISOLATION LEVEL** parameter to specify an isolation level for the connection to a remote server.

Isolation level	Characteristics
READ UNCOMMITTED	• Isolation level 0 • Read permitted on row with or without write lock • No read locks are applied • No guarantee that concurrent transaction will not modify row or roll back changes to row
READ COMMITTED	• Isolation level 1 • Read only permitted on row with no write lock • Read lock acquired and held for read on current row only, but released when cursor moves off the row • No guarantee that data will not change during transaction
SERIALIZABLE	• Isolation level 3 • Read only permitted on rows in result without write lock • Read locks acquired when cursor is opened and held until transaction ends

SAP Sybase IQ does not support the Adaptive Server Enterprise data type TEXT, but you can execute **INSERT...LOCATION** (Syntax 3) from both an IQ CHAR or VARCHAR column whose length is greater than 255 bytes, and from an ASE database column of data type TEXT. ASE TEXT and IMAGE columns can be inserted into columns of other SAP Sybase IQ data types, if SAP Sybase IQ supports the internal conversion. By default, if a remote data column contains over 2GB, SAP Sybase IQ silently truncates the column value to 2GB.

Warning! SAP Sybase IQ does not support the Adaptive Server Enterprise data types UNICHAR, UNIVARCHAR, or UNITEXT. An **INSERT...LOCATION** command from UNICHAR or UNITEXT to CHAR or CLOB columns in the ISO_BINENG collation may execute without error; if this happens, the data in the columns may be inconsistent. An error is reported in this situation, only if the conversion fails.

Users must be specifically licensed to use the large object functionality of the Unstructured Data Analytics Option.

Note: If you use **INSERT...LOCATION** to insert data selected from a **VARBINARY** column, set **ASE_BINARY_DISPLAY** to OFF on the remote database.

INSERT...LOCATION (Syntax 3) does not support the use of variables in the **SELECT** statement.

Inserts can be done into views, provided the **SELECT** statement defining the view has only one table in the **FROM** clause and does not contain a **GROUP BY** clause, an aggregate function, or involve a **UNION** operation.

Character strings inserted into tables are always stored in the case they are entered, regardless of whether the database is case-sensitive or not. Thus, a string “Value” inserted into a table is always held in the database with an uppercase V and the remainder of the letters lowercase. **SELECT** statements return the string as 'Value.' If the database is not case-sensitive, however, all comparisons make 'Value' the same as 'value,' 'VALUE,'' and so on. Further, if a single-column primary key already contains an entry Value, an **INSERT** of value is rejected, as it would make the primary key not unique.

Whenever you execute an **INSERT...LOCATION** statement, SAP Sybase IQ loads the localization information needed to determine language, collation sequence, character set, and date/time format. If your database uses a nondefault locale for your platform, you must set an environment variable on your local client to ensure that SAP Sybase IQ loads the correct information.

If you set the LC_ALL environment variable, SAP Sybase IQ uses its value as the locale name. If LC_ALL is not set, SAP Sybase IQ uses the value of the LANG environment variable. If neither variable is set, SAP Sybase IQ uses the default entry in the locales file.

Use the `(DEFAULT)`, `DEFAULT VALUES` or `VALUES()` clauses in an to insert rows with all default values. Assuming that there are 3 columns in table t2, these examples are semantically equivalent:

```
INSERT INTO t2 values (DEFAULT, DEFAULT, DEFAULT);
```

```
INSERT INTO t2 DEFAULT VALUES;
```

```
INSERT INTO t2() VALUES();
```

INSERT...VALUES also supports multiple rows. The following example inserts 3 rows into table t1:

```
CCREATE TABLE t1(c1 varchar(30));
INSERT INTO t1 VALUES  ('morning'),('afternoon'),
    ('evening');
```

SAP Sybase IQ treats all load/inserts as full-width inserts. Columns not explicitly specified on the load/insert statement, the value loaded will either be the column’s `DEFAULT` value (if one is defined) or `NULL` (if no `DEFAULT` value is defined for the column).

The **LIMIT** option specifies the maximum number of rows to insert into the table from a query. The default is 0 for no limit. The maximum is 2GB -1.

The **NOTIFY** option specifies that you be notified with a message each time the number of rows are successfully inserted into the table. The default is every 100,000 rows.

The **SKIP** option lets you define a number of rows to skip at the beginning of the input tables for this insert. The default is 0.

For information on the *insert-select-load-options* **WORD SKIP**, **IGNORE CONSTRAINT**, **MESSAGE LOG**, **ROW LOG**, and **LOG DELIMITED BY** and the *constrainttype* and *logwhat* parameters, see the *LOAD TABLE Statement*.

An **INSERT** on a multicolumn index must include all columns of the index.

SAP Sybase IQ supports column DEFAULT values for **INSERT...VALUES**, **INSERT...SELECT**, and **INSERT...LOCATION**. If a DEFAULT value is specified for a column, this DEFAULT value is used as the value of the column in any **INSERT** (or **LOAD**) statement that does not specify a value for the column.

An **INSERT** from a stored procedure or function is not permitted, if the procedure or function uses **COMMIT**, **ROLLBACK**, or some **ROLLBACK TO SAVEPOINT** statements.

The result of a **SELECT…FROM** may be slightly different from the result of an **INSERT… SELECT…FROM** due to an internal data conversion of an imprecise data type, such as `DOUBLE` or `NUMERIC`, for optimization during the insert. If a more precise result is required, a possible workaround is to declare the column as a `DOUBLE` or `NUMERIC` data type with a higher precision.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Adaptive Server Enterprise (excluding the *insert-load-options*).

Permissions

Requires INSERT privilege on the table.

See also

- *CREATE EXTERNLOGIN Statement* on page 127
- *DELETE Statement* on page 241
- *LOAD TABLE Statement* on page 335

INSTALL JAVA Statement

Makes Java classes available for use within a database.

Syntax

INSTALL JAVA [*install-mode*] [**JAR** *jar-name*] **FROM** *source*

Parameters

- **install-mode –** { **NEW** | **UPDATE** }
- **source –** { **FILE** *filename* | **URL** *url-value* }

Examples

- **Example 1 –** Install the user-created Java class named "Demo" by providing the file name and location of the class:

```
INSTALL JAVA NEW
FROM FILE 'D:\JavaClass\Demo.class'
```

  After installation, the class is referenced using its name. Its original file path location is no longer used. For example, this statement uses the class installed in the previous statement:

```
CREATE VARIABLE d Demo
```

  If the Demo class was a member of the package sybase.work, the fully qualified name of the class must be used:

```
CREATE VARIABLE d sybase.work.Demo
```

- **Example 2 –** Install all the classes contained in a zip file and associate them within the database with a JAR file name:

```
INSTALL JAVA
JAR 'Widgets'
FROM FILE 'C:\Jars\Widget.zip'
```

  The location of the zip file is not retained and classes must be referenced using the fully qualified class name (package name and class name).

Usage

- **Install mode –** Specifying an install mode of **NEW** requires that the referenced Java classes be new classes, rather than updates of currently installed classes. An error occurs if a class with the same name exists in the database and the **NEW** install mode is used.

  An install mode of **UPDATE** specifies that the referenced Java classes may include replacements for Java classes already installed in the given database.

  To update a class or JAR, you must have the MANAGE ANY EXTERNAL OBJECT system privilege and a newer version of the compiled class file or JAR file available in a file on disk.

  Only new connections established after installing the class, or that use the class for the first time after installing the class, use the new definition. Once the Java VM loads a class definition, it stays in memory until the connection closes.

  If you have been using a Java class or objects based on a class in the current connection, you need to disconnect and reconnect to use the new class definition.

If install mode is omitted, the default is **NEW**.

- **JAR –** Specifies that the *file-name* or *text-pointer* must designate a JAR file or a column containing a JAR. JAR files typically have extensions of `.jar` or `.zip`.

  Installed JAR and zip files can be compressed or uncompressed. However, JAR files produced by the Sun JDK **jar** utility are not supported. Files produced by other zip utilities are supported.

  If the JAR option is specified, then the JAR is retained as a JAR after the classes that it contains have been installed. That JAR is the associated JAR of each of those classes. The set of JARs installed in a database with the **JAR** option are called the retained JARs of the database.

  Retained JARs are referenced in **INSTALL** and **REMOVE** statements. Retained JARs have no effect on other uses of Java-SQL classes. Retained JARs are used by the SQL system for requests by other systems for the class associated with given data. If a requested class has an associated JAR, the SQL system can supply that JAR, rather than the individual class.

  jar-name is a character string value of length up to 255 bytes. *jar-name* is used to identify the retained JAR in subsequent **INSTALL**, **UPDATE**, and **REMOVE** statements.
- **source –** Specifies the location of the Java classes to be installed.

  The formats supported for *file-name* include fully qualified file names, such as `'c:\libs\jarname.jar'` and `'/usr/u/libs/jarname.jar'`, and relative file names, which are relative to the current working directory of the database server.

  The *filename* must identify either a class file or a JAR file.

  The class definition for each class is loaded by the VM of each connection the first time that class is used. When you **INSTALL** a class, the VM on your connection is implicitly restarted. Therefore, you have immediate access to the new class, whether the **INSTALL** has an *install-mode* of **NEW** or **UPDATE**.

  For other connections, the new class is loaded the next time a VM accesses the class for the first time. If the class is already loaded by a VM, that connection does not see the new class until the VM is restarted for that connection (for example, with a **STOP JAVA** and **START JAVA**).

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

- Requires the MANAGE ANY EXTERNAL OBJECT system privilege to execute the **INSTALL** statement.
- All installed classes can be referenced in any way by any user.

See also

- *REMOVE Statement* on page 378

IQ UTILITIES Statement

Starts a cache monitor that collects buffer cache statistics.

Syntax

```
IQ UTILITIES { MAIN | PRIVATE }
[ INTO ] table-name
{ START MONITOR ['monitor-options']
| STOP MONITOR }
```

Parameters

- **monitor-options –** { **-summary** | { **-append | -truncate** } **-bufalloc** | **-cache** | **-cache_by_type** | **-contention** | **-debug** | **-file_suffix** *suffix*| **-io** | **-interval** *seconds* | **-threads** }...

Examples

- **Example 1 –** Start the buffer cache monitor and record activity for the IQ temp buffer cache:

```
IQ UTILITIES PRIVATE INTO monitor START MONITOR '-cache -interval
20'
```

Usage

START MONITOR starts the IQ buffer cache monitor. **MAIN** monitors all tables in the main buffer cache of the IQ Store. **PRIVATE** monitors all tables in the temp buffer cache of the temporary Store.

Issue separate commands to monitor each buffer cache. Keep each sessions open while the monitor collects results; a monitor run stops when you close its connection. A connection can run up to a maximum of two monitor runs, one for the main and one for the temp buffer cache.

dummy_table_name can be any SAP Sybase IQ base or temporary table. The table name is required for syntactic compatibility with other **IQ UTILITIES** commands. It is best to have a table that you use only for monitoring.

To control the directory placement of monitor output files, set the `MONITOR_OUTPUT_DIRECTORY` option. If this option is not set, the monitor sends output to the same directory as the database. All monitor output files are used for the duration of the monitor runs. They remain after a monitor run has stopped.

Buffer cache monitor output depends on the switches you include with the **monitor_options** argument. You can specify more than one, and they must be enclosed with quotation marks.

Table 9. Buffer Cach Monitor Output Options

Parameter	Description
-summary	Displays summary information for both the main and temp buffer caches. If you do not specify any monitor options, you receive a summary report. Usage: `monitor_options -summary`
-cache	Displays main or temp buffer cache activity in detail. Critical fields are `Finds`, `HR%`, and `BWaits`. Usage: `monitor_options -cache`
-cache_by_type	Breaks **-cache** results down by IQ page type. (An exception is the `Bwaits` column, which shows a total only.) This format is most useful when you need to supply information to Technical Support. Usage: `monitor_options -cache_by_type`
-file_suffix	Creates a monitor output file named `<dbname>.<connid>-<main_or_temp>-<suffix>`. If you do not specify an optional file extension, the file extension defaults to `.iqmon`. Usage: `monitor_options -file_suffix {extension}`
-io	Displays main or temp (private) buffer cache I/O rates and compression ratios during the specified interval. These counters represent all activity for the server; the information is not broken out by device. Usage: `monitor_options -io`
-bufalloc	Displays information on the main or temp buffer allocator, which reserves space in the buffer cache for objects like sorts, hashes, and bitmaps. Usage: `monitor_options -bufalloc`
-contention	Displays many key buffer cache and memory manager locks. These lock and mutex counters show the activity within the buffer cache and heap memory and how quickly these locks were resolved. Timeout numbers that exceed 20% indicate a problem. Usage: `monitor_options -contention`

Parameter	Description
-threads	Displays the processing thread manager counts. Values are server-wide (i.e., it does not matter whether you select this option for main or private). Usage: `monitor_options -threads`
-interval	Specifies the reporting interval in seconds. The default is every 60 seconds. The minimum is every 2 seconds. You can usually get useful results by running the monitor at the default interval during a query or time of day with performance problems. Short intervals may not give meaningful results. Intervals should be proportional to the job time; one minute is generally more than enough. Usage: `monitor_options -interval`
-append | - truncate	Append or truncate output to existing output file. Truncate is the default. Usage: `monitor_options -append | -truncate`
-debug	Displays all information available to the performance monitor, whether or not there is a standard display mode that covers the same information. **-debug** is used mainly to supply information to Technical Support. Usage: `monitor_options -debug`

Either declare a temporary table for use in monitoring, or create a permanent dummy table when you create a new database, before creating any multiplex query servers. These solutions avoid DDL changes, so that data stays up on query servers during production runs.

On UNIX-like operating systems, you can watch monitor output as queries are running. Starting the monitor with this command:

```
iq utilities main into monitor_tab
start monitor "-cache -interval 2 -file_suffix iqmon"
```

sends the output to an ASCII file with the name `dbname.conn#-[main|temp]-iqmon`. So, for the iqdemo database, the buffer monitor would send the results to `iqdemo.2-main-iqmon`

The buffer cache monitor writes the results of each run to these logs:

- `dbname.connection#-main-iqmon //for main buffer cache results`

- `dbname.connection#-temp-iqmon //for temp buffer cache results`

The prefix *dbname.connection#* represents your database name and connection number. If you see more than one connection number and are uncertain which is yours, you can run the Catalog stored procedure **sa_conn_info**. This procedure displays the connection number, user ID, and other information for each active connection to the database.

Use the **-file_suffix** parameter to change the suffix `iqmon` to a suffix of your choice. Use a text editor to display or print a file.

Running the monitor again from the same database and connection number, overwrites the previous results. To save the results of a monitor run, copy the file to another location or use the **-append** option.

The command you use to stop a monitor run is similar to the one you use to start it, except that you do not need to specify any options:

```
IQ UTILITIES { MAIN | PRIVATE }
  INTO dummy_table_name STOP MONITOR
```

Note:

- To simplify monitor use, create a stored procedure to declare the dummy table, specify its output location, and start the monitor.
- The interval, with two exceptions, applies to each line of output, not to each page. The exceptions are **-cache_by_type** and **-debug**, where a new page begins for each display.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported in Adaptive Server Enterprise.

Permissions

None

See also

- *MONITOR_OUTPUT_DIRECTORY Option* on page 575

LEAVE Statement

Continues execution by leaving a compound statement or **LOOP**.

Syntax

```
LEAVE statement-label
```

Examples

- **Example 1 –** This code fragment shows how to use the **LEAVE** statement to leave a loop:

```
SET i = 1;
lbl:
LOOP
  INSERT
  INTO Counters ( number )
  VALUES ( i ) ;
  IF i >= 10 THEN
    LEAVE lbl ;
  END IF ;
  SET i = i + 1
END LOOP lbl
```

- **Example 2 –** This code fragment uses **LEAVE** in a nested loop:

```
outer_loop:
LOOP
  SET i = 1;
  inner_loop:
  LOOP
    ...
    SET i = i + 1;
    IF i >= 10 THEN
      LEAVE outer_loop
    END IF
  END LOOP inner_loop
END LOOP outer_loop
```

Usage

LEAVE is a control statement that lets you leave a labeled compound statement or a labeled loop. Execution resumes at the first statement after the compound statement or loop.

The compound statement that is the body of a procedure has an implicit label that is the same as the name of the procedure.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported in Adaptive Server Enterprise. The break statement provides a similar feature for Transact-SQL compatible procedures.

Permissions

None

See also

- *BEGIN … END Statement* on page 81
- *FOR Statement* on page 280

- *LOOP Statement* on page 355

LOAD TABLE Statement

Imports data into a database table from an external file.

Syntax

```
LOAD [ INTO ] TABLE [ owner.]table-name
... ( load-specification [, …] )
...  { FROM | USING [ CLIENT ] FILE }
{ 'filename-string' | filename-variable } [, …]
... [ CHECK CONSTRAINTS { ON | OFF } ]
... [ DEFAULTS { ON | OFF } ]
... [ QUOTES OFF ]
... ESCAPES OFF
... [ FORMAT { ascii | binary | bcp } ]
... [ DELIMITED BY 'string' ]
... [ STRIP { OFF | RTRIM } ]
... [ WITH CHECKPOINT { ON | OFF } ]
... [ BYTE ORDER { NATIVE | HIGH | LOW } ]
... [ LIMIT number-of-rows ]
... [ NOTIFY number-of-rows ]
... [ ON FILE ERROR { ROLLBACK | FINISH | CONTINUE } ]
... [ PREVIEW { ON | OFF } ]
... [ ROW DELIMITED BY 'delimiter-string' ]
... [ SKIP number-of-rows ]
... [ HEADER SKIP number [ HEADER DELIMITED BY 'string' ] ]
... [ WORD SKIP number ]
... [ ON PARTIAL INPUT ROW { ROLLBACK | CONTINUE } ]
... [ IGNORE CONSTRAINT constrainttype [, …] ]
... [ MESSAGE LOG 'string' ROW LOG 'string' [ ONLY LOG logwhat [, …] ]
... [ LOG DELIMITED BY 'string' ]
```

Parameters

- **load-specification –**

```
{ column-name [ column-spec ]
        | FILLER ( filler-type )
      }
```

- **column-spec –**

```
{ ASCII ( input-width )
        | BINARY [ WITH NULL BYTE ]
        | PREFIX { 1 | 2 | 4 }
        | 'delimiter-string'
        | DATE [ FORMAT ] ( input-date-format ) [, input-date-
format, …]
        | DATETIME [ FORMAT ] ( input-datetime-format [, input-
datetime-format, …]  )
        | ENCRYPTED ( data-type 'key-string' [, 'algorithm-
string' ] )
```

```
        | DEFAULT default-value
        } [ NULL ( { BLANKS | ZEROS | 'literal',  …}
      )
```

- **filler-type –**

```
{ input-width
        | PREFIX { 1 | 2 | 4 }
        | 'delimiter-string'
      }
```

- **constrainttype –**

```
{ CHECK integer
        | UNIQUE integer
        | NULL integer
        | FOREIGN KEYinteger
        | DATA VALUE integer
        | ALL integer
      }
```

- **logwhat –**

```
{ CHECK
        | ALL
        | NULL
        | UNIQUE
        | DATA VALUE
        | FOREIGN KEY
        | WORD
    }
```

Examples

- **Example 1 –** Load data from one file into the `Products` table on a Windows system. A tab is used as the column delimiter following the `Description` and `Color` columns:

```
LOAD TABLE Products
( ID ASCII(6),
FILLER(1),
Name   ASCII(15),
FILLER(1),
Description   '\x09',
Size   ASCII(2),
FILLER(1),
Color   '\x09',
Quantity   PREFIX 2,
UnitPrice   PREFIX 2,
FILLER(2) )
FROM 'C:\\mydata\\source1.dmp'
QUOTES OFF
ESCAPES OFF
BYTE ORDER LOW
NOTIFY 1000
```

- **Example 2 –** Load data from a file `a.inp` on a client computer:

```
LOAD TABLE t1(c1,c2,filler(30))
USING CLIENT FILE 'c:\\client-data\\a.inp'
```

```
QUOTES OFF ESCAPES OFF
IGNORE CONSTRAINT UNIQUE 0, NULL 0
MESSAGE LOG 'c:\\client-data\\m.log'
ROW LOG 'c:\\client-data\\r.log'ONLY LOG UNIQUE
```

- **Example 3 –** Load data from two files into the `product_new` table (which allows NULL values) on a UNIX system. The tab character is the default column delimiter, and the newline character is the row delimiter:

```
LOAD TABLE product_new
( id,
name,
description,
size,
color   '\x09'   NULL( 'null', 'none', 'na' ),
quantity   PREFIX 2,
unit_price   PREFIX 2 )
FROM '/s1/mydata/source2.dump',
'/s1/mydata/source3.dump'
QUOTES OFF
ESCAPES OFF
FORMAT ascii
DELIMITED BY '\x09'
ON FILE ERROR CONTINUE
ROW DELIMITED BY '\n'
```

- **Example 4 –** Ignore 10 word-length violations; on the 11th, deploy the new error and roll back the load:

```
load table PTAB1(
       ck1          ','  null ('NULL') ,
       ck3fk2c2     ','  null ('NULL') ,
       ck4          ','  null ('NULL') ,
       ck5          ','  null ('NULL') ,
       ck6c1        ','  null ('NULL') ,
       ck6c2        ','  null ('NULL') ,
       rid          ','  null ('NULL')  )
FROM 'ri_index_selfRI.inp'
       row delimited by '\n'
       LIMIT 14   SKIP 10
       IGNORE CONSTRAINT UNIQUE 2, FOREIGN KEY 8
       word skip 10 quotes off escapes off strip
       off
```

- **Example 5 –** Load data into table `t1` from the **BCP** character file `bcp_file.bcp` using the **FORMAT BCP** load option:

```
LOAD TABLE t1 (c1, c2, c3)
FROM 'bcp_file.bcp'
FORMAT BCP
...
```

- **Example 6 –** Load default values 12345 into `c1` using the **DEFAULT** load option, and load `c2` and `c3` with data from the `LoadConst04.dat` file:

```
LOAD TABLE t1 (c1 DEFAULT '12345 ', c2, c3, filler(1))
FROM 'LoadConst04.dat'
```

```
STRIP OFF
QUOTES OFF
ESCAPES OFF
DELIMITED BY ',';
```

- **Example 7 –** Load `c1` and `c2` with data from the file `bcp_file.bcp` using the **FORMAT BCP** load option and set `c3` to the value 10:

```
LOAD TABLE t1 (c1, c2, c3 DEFAULT '10')
FROM 'bcp_file.bcp'
FORMAT BCP
QUOTES OFF
ESCAPES OFF;
```

- **Example 8 –** This code fragment ignores one header row at the beginning of the data file, where the header row is delimited by '&&':

```
LOAD TABLE
...HEADER SKIP 1 HEADER DELIMITED by '&&'
```

- **Example 9 –** This code fragment ignores 2 header rows at the beginning of the data file, where each header row is delimited by '\n':

```
LOAD TABLE
...HEADER SKIP 2
```

- **Example 10 –** Load a file into a RLV-enabled table.

  Load data into RLV-enabled table `rvt1` from the **BCP** character file `bcp_file.bcp` using the **FORMAT BCP** load option:

```
LOAD TABLE rvt1 (c1, c2, c3)
FROM 'bcp_file.bcp'
FORMAT BCP
...
```

Usage

The **LOAD TABLE** statement allows efficient mass insertion into a database table from a file with ASCII or binary data.

The **LOAD TABLE** options also let you control load behavior when integrity constraints are violated and to log information about the violations.

You can use **LOAD TABLE** on a temporary table, but the temporary table must have been declared with **ON COMMIT PRESERVE ROWS**, or the next **COMMIT** removes the rows you have loaded.

You can also specify more than one file to load data. In the **FROM** clause, specify each `filename-string` separated by commas. Because of resource constraints, SAP Sybase IQ does not guarantee that all the data can be loaded. If resource allocation fails, the entire load transaction is rolled back. The files are read one at a time, and processed in the order specified in the **FROM** clause. Any **SKIP** or **LIMIT** value only applies in the beginning of the load, not for each file.

Note: When loading a multiplex database, use absolute (fully qualified) paths in all file names. Do not use relative path names.

LOAD TABLE supports loading of large object (LOB) data.

SAP Sybase IQ supports loading from both ASCII and binary data, and it supports both fixed- and variable-length formats. To handle all of these formats, you must supply a *load-specification* to tell SAP Sybase IQ what kind of data to expect from each "column" or field in the source file. The *column-spec* lets you define these formats:

- ASCII with a fixed length of bytes. The *input-width* value is an integer indicating the fixed width in bytes of the input field in every record.
- Binary or non-binary fields that use a number of PREFIX bytes (1, 2, or 4) to specify the length of the input.

  There are two parts related to a **PREFIX** clause:
  - Prefix value – always a binary value.
  - Associated data bytes – always character format; never binary format.

  If the data is unloaded using the extraction facility with the `TEMP_EXTRACT_BINARY` option set ON, you must use the **BINARY WITH NULL BYTE** parameter for each column when you load the binary data.
- Variable-length characters delimited by a separator. You can specify the terminator as hexadecimal ASCII characters. The *delimiter-string* can be any string of up to 4 characters, including any combination of printable characters, and any 8-bit hexadecimal ASCII code that represents a nonprinting character. For example, specify:
  - '\x09' to represent a tab as the terminator.
  - '\x00' for a null terminator (no visible terminator as in "C" strings).
  - '\x0a' for a newline character as the terminator. You can also use the special character combination of '\n' for newline.

  Note: The delimiter string can be from 1 to 4 characters long, but you can specify only a single character in the **DELIMITED BY** clause. For **BCP**, the delimiter can be up to 10 characters.
- DATE or DATETIME string as ASCII characters. You must define the *input-date-format* or *input-datetime-format* of the string using one of the corresponding formats for the date and datetime data types supported by SAP Sybase IQ. Use **DATE** for date values and **DATETIME** for datetime and time values.

Table 10. Formatting Dates and Times

Option	Meaning
yyyy or YYYY yy or YY	Represents number of year. Default is current year.

Option	Meaning
mm or MM	Represents number of month. Always use leading zero or blank for number of the month where appropriate, for example, '05' for May. DATE value must include a month. For example, if the **DATE** value you enter is 1998, you receive an error. If you enter '03', SAP Sybase IQ applies the default year and day and converts it to '1998-03-01'.
dd or DD jjj or JJJ	Represents number of day. Default day is 01. Always use leading zeros for number of day where appropriate, for example, '01' for first day. J or j indicates a Julian day (1 to 366) of the year.
hh HH	Represents hour. Hour is based on 24-hour clock. Always use leading zeros or blanks for hour where appropriate, for example, '01' for 1 am. '00' is also valid value for hour of 12 a.m.
nn	Represents minute. Always use leading zeros for minute where appropriate, for example, '08' for 8 minutes.
ss[.ssssss]	Represents seconds and fraction of a second.
aa	Represents the a.m. or p.m. designation.
pp	Represents the p.m. designation only if needed. (This is an incompatibility with SAP Sybase IQ versions earlier than 12.0; previously, “pp” was synonymous with “aa”.)
hh	SAP Sybase IQ assumes zero for minutes and seconds. For example, if the **DATETIME** value you enter is '03', SAP Sybase IQ converts it to '03:00:00.0000'.
hh:nn or hh:mm	SAP Sybase IQ assumes zero for seconds. For example, if the time value you enter is '03:25', SAP Sybase IQ converts it to '03:25:00.0000'.

Table 11. Sample DATE and DATETIME Format Options

Input data	Format specification
12/31/98	**DATE** ('MM/DD/YY')
19981231	**DATE** ('YYYYMMDD')
123198140150	**DATETIME** ('MMDDYYhhnnss')
14:01:50 12-31-98	**DATETIME** ('hh:nn:ss MM-DD-YY')
18:27:53	**DATETIME** ('hh:nn:ss')
12/31/98 02:01:50AM	**DATETIME** ('MM/DD/YY hh:nn:ssaa')

SAP Sybase IQ has built-in load optimizations for common date, time, and datetime formats. If your data to be loaded matches one of these formats, you can significantly decrease load time by using the appropriate format.

You can also specify the date/time field as an ASCII fixed-width field (as described above) and use the FILLER(1) option to skip the column delimiter.

The NULL portion of the *column-spec* indicates how to treat certain input values as NULL values when loading into the table column. These characters can include BLANKS, ZEROS, or any other list of literals you define. When specifying a NULL value or reading a NULL value from the source file, the destination column must be able to contain NULLs.

ZEROS are interpreted as follows: the cell is set to NULL if (and only if) the input data (before conversion, if ASCII) is all binary zeros (and not character zeros).

- If the input data is character zero, then:
  1. NULL (ZEROS) never causes the cell to be NULL.
  2. NULL ('0') causes the cell to be NULL.
- If the input data is binary zero (all bits clear), then:
  1. NULL (ZEROS) causes the cell to be NULL.
  2. NULL ('0') never causes the cell to be NULL.

For example, if your **LOAD** statement includes `col1 date('yymmdd') null(zeros)` and the date is 000000, you receive an error indicating that 000000 cannot be converted to a `DATE`(4). To get **LOAD TABLE** to insert a NULL value in `col1` when the data is 000000, either write the NULL clause as `null('000000')`, or modify the data to equal binary zeros and use NULL(ZEROS).

If the length of a `VARCHAR` cell is zero and the cell is not NULL, you get a zero-length cell. For all other data types, if the length of the cell is zero, SAP Sybase IQ inserts a NULL. This is ANSI behavior. For non-ANSI treatment of zero-length character data, set the **NON_ANSI_NULL_VARCHAR** database option.

Use the **DEFAULT** option to specify a load default column value. You can load a default value into a column, even if the column does not have a default value defined in the table schema. This feature provides more flexibility at load time.

- The **LOAD TABLE DEFAULTS** option must be ON in order to use the default value specified in the **LOAD TABLE** statement. If the **DEFAULTS** option is OFF, the specified load default value is not used and a NULL value is inserted into the column instead.
- The **LOAD TABLE** command must contain at least one column that needs to be loaded from the file specified in the **LOAD TABLE** command. Otherwise, an error is reported and the load is not performed.
- The specified load default value must conform to the supported default values for columns and default value restrictions. The **LOAD TABLE DEFAULT** option does not support **AUTOINCREMENT**, **IDENTITY**, or **GLOBAL AUTOINCREMENT** as a load default value.
- The **LOAD TABLE DEFAULT** *default-value* must be of the same character set as that of the database.
- Encryption of the default value is not supported for the load default values specified in the **LOAD TABLE DEFAULT** clause.
- A constraint violation caused by evaluation of the specified load default value is counted for each row that is inserted in the table.

Another important part of the *load-specification* is the **FILLER** option. This option indicates you want to skip over a specified field in the source input file. For example, there may be

characters at the end of rows or even entire fields in the input files that you do not want to add to the table. As with the *column-spec* definition, **FILLER** specifies ASCII fixed length of bytes, variable length characters delimited by a separator, and binary fields using PREFIX bytes.

The *filename-string* is passed to the server as a string. The string is therefore subject to the same formatting requirements as other SQL strings. In particular:

- To indicate directory paths in Windows systems, the backslash character \ must be represented by two backslashes. Therefore, the statement to load data from the file `c:\temp\input.dat` into the `Employees` table is:

```
LOAD TABLE Employees
FROM 'c:\\temp\\input.dat' ...
```

- The path name is relative to the database server, not to the client application. If you are running the statement on a database server on some other computer, the directory names refers to directories on the server machine, not on the client machine.

Descriptions of each statement clause follow:

USING— **USING FILE** loads one or more files from the server. This clause is synonymous with specifying the **FROM** *filename* clause. **USING CLIENT FILE** bulk loads one or more files from a client. The character set of the file on the client side must be the same as the server collation. SAP Sybase IQ serially processes files in the file list. Each file is locked in read mode as it is processed, then unlocked. Client-side bulk loading incurs no administrative overhead, such as extra disk space, memory or network-monitoring daemon requirements.

When bulk loading large objects, the **USING CLIENT FILE** clause applies to both primary and secondary files.

During client-side loads, the **IGNORE CONSTRAINT** log files are created on the client host and any error while creating the log files causes the operation to roll back.

Client-side bulk loading is supported by Interactive SQL and ODBC/JDBC clients using the Command Sequence protocol. It is not supported by clients using the TDS protocol. For data security over a network, use Transport Layer Security. To control who can use client-side bulk loads, use the secure feature (**-sf**) server startup switch, the `ALLOW_READ_CLIENT_FILE` database option, and/or the `READCLIENTFILE` access control.

The **LOAD TABLE FROM** clause is deprecated, but may be used to specify a file that exists on the server.

This example loads data from the file `a.inp` on a client computer.

```
LOAD TABLE t1(c1,c2,filler(30))
USING CLIENT FILE 'c:\\client-data\\a.inp'
QUOTES OFF ESCAPES OFF
IGNORE CONSTRAINT UNIQUE 0, NULL 0
MESSAGE LOG 'c:\\client-data\\m.log'
ROW LOG 'c:\\client-data\\r.log'
ONLY LOG UNIQUE
```

CHECK CONSTRAINTS—This option defaults to ON. When you specify **CHECK CONSTRAINTS ON**, check constraints are evaluated and you are free to ignore or log them.

Setting **CHECK CONSTRAINTS OFF** causes SAP Sybase IQ to ignore all check constraint violations. This can be useful, for example, during database rebuilding. If a table has check constraints that call user-defined functions that are not yet created, the rebuild fails unless this option is set to OFF.

This option is mutually exclusive to the following options. If any of these options are specified in the same load, an error results:

- **IGNORE CONSTRAINT ALL**
- **IGNORE CONSTRAINT CHECK**
- **LOG ALL**
- **LOG CHECK**

DEFAULTS—If the **DEFAULTS** option is ON (the default) and the column has a default value, that value is used. If the **DEFAULTS** option is OFF, any column not present in the column list is assigned NULL.

The setting for the **DEFAULTS** option applies to all column DEFAULT values, including AUTOINCREMENT.

QUOTES—This parameter is optional and the default is ON. With **QUOTES** turned on, **LOAD TABLE** expects input strings to be enclosed in quote characters. The quote character is either an apostrophe (single quote) or a quotation mark (double quote). The first such character encountered in a string is treated as the quote character for the string. String data must be terminated with a matching quote.

With **QUOTES ON**, column or row delimiter characters can be included in the column value. Leading and ending quote characters are assumed not to be part of the value and are excluded from the loaded data value.

To include a quote character in a value with **QUOTES ON**, use two quotes. For example, this line includes a value in the third column that is a single quote character:

```
'123 High Street, Anytown', '(715)398-2354',''''
```

With **STRIP** turned on (the default), trailing blanks are stripped from values before they are inserted. Trailing blanks are stripped only for non-quoted strings. Quoted strings retain their trailing blanks. Leading blank or TAB characters are trimmed only when the **QUOTES** setting is ON.

The data extraction facility provides options for handling quotes (`TEMP_EXTRACT_QUOTES`, `TEMP_EXTRACT_QUOTES_ALL`, and `TEMP_EXTRACT_QUOTE`). If you plan to extract data to be loaded into an IQ main store table and the string fields contain column or row delimiter under default ASCII extraction, use the `TEMP_EXTRACT_BINARY` option for the extract and the **FORMAT binary** and **QUOTES OFF** options for **LOAD TABLE**.

Limits:

- **QUOTES ON** applies only to column-delimited ASCII fields.
- With **QUOTES ON**, the first character of a column delimiter or row terminator cannot be a single or double quote mark.
- The **QUOTES** option does not apply to loading binary large object (`BLOB`) or character large object (`CLOB`) data from the secondary file, regardless of its setting. A leading or trailing quote is loaded as part of `CLOB` data. Two consecutive quotes between enclosing quotes are loaded as two consecutive quotes with the **QUOTES ON** option.
- Adaptive Server Enterprise **BCP** does not support the **QUOTES** option. All field data is copied in or out equivalent to the **QUOTES OFF** setting. As **QUOTES ON** is the default setting for the SAP Sybase IQ **LOAD TABLE** statement, you must specify **QUOTES OFF** when importing ASE data from **BCP** output to an SAP Sybase IQ table.

Exceptions:

- If **LOAD TABLE** encounters any nonwhite characters after the ending quote character for an enclosed field, this error is reported and the load operation is rolled back:

```
Non-SPACE text found after ending quote character for
an enclosed field.
SQLSTATE: QTA14    SQLCODE: -1005014L
```

- With **QUOTES ON**, if a single or double quote is specified as the first character of the column delimiter, an error is reported and the load operation fails:

```
Single or double quote mark cannot be the 1st character
of column delimiter or row terminator with QUOTES option
ON.
SQLSTATE: QCA90    SQLCODE: -1013090L
```

ESCAPES—If you omit a *column-spec* definition for an input field and **ESCAPES** is ON (the default), characters following the backslash character are recognized and interpreted as special characters by the database server. You can include newline characters as the combination \n, and other characters as hexadecimal ASCII codes, such as \x09 for the tab character. A sequence of two backslash characters (\\ ) is interpreted as a single backslash. For SAP Sybase IQ, you must set **ESCAPES** OFF.

FORMAT—SAP Sybase IQ supports ASCII and binary input fields. The format is usually defined by the *column-spec* described above. If you omit that definition for a column, by default SAP Sybase IQ uses the format defined by this option. Input lines are assumed to have **ascii** (the default) or **binary** fields, one row per line, with values separated by the column delimiter character.

SAP Sybase IQ also accepts data from BCP character files as input to the **LOAD TABLE** command.

- The BCP data file loaded into SAP Sybase IQ tables using the **LOAD TABLE FORMAT BCP** statement must be exported (**BCP OUT**) in cross-platform file format using the **-c** option.

- For **FORMAT BCP**, the default column delimiter for the **LOAD TABLE** statement is <tab> and the default row terminator is <newline>.
- For **FORMAT BCP**, the last column in a row must be terminated by the row terminator, not by the column delimiter. If the column delimiter is present before the row terminator, then the column delimiter is treated as a part of the data.
- Data for columns that are not the last column in the load specification must be delimited by the column delimiter only. If a row terminator is encountered before a column delimiter for a column that is not the last column, then the row terminator is treated as a part of the column data.
- Column delimiter can be specified via the **DELIMITED BY** clause. For **FORMAT BCP**, the delimiter must be less than or equal to 10 characters in length. An error is returned, if the delimiter length is more than 10.
- For **FORMAT BCP**, the load specification may contain only column names, **NULL**, and **ENCRYPTED**. An error is returned, if any other option is specified in the load specification.

  For example, these **LOAD TABLE** load specifications are valid:

```
LOAD TABLE x( c1, c2 null(blanks), c3 )
FROM 'bcp_file.bcp'
FORMAT BCP
...
```

```
LOAD TABLE x( c1 encrypted(bigint,'KEY-ONE','aes'), c2, c3 )
FROM 'bcp_file.bcp'
FORMAT BCP
...
```

DELIMITED BY—If you omit a column delimiter in the *column-spec* definition, the default column delimiter character is a comma. You can specify an alternative column delimiter by providing a single ASCII character or the hexadecimal character representation. The **DELIMITED BY** clause is:

```
... DELIMITED BY '\x09' ...
```

To use the newline character as a delimiter, you can specify either the special combination '\n' or its ASCII value '\x0a'. Although you can specify up to four characters in the column-spec *delimiter-string*, you can specify only a single character in the **DELIMITED BY** clause.

STRIP—The **STRIP** clause specifies whether unquoted values should have trailing blanks stripped off before they are inserted. The **LOAD TABLE** command accepts these **STRIP** keywords:

- STRIP OFF—Do not strip off trailing blanks.
- STRIP RTRIM—Strip trailing blanks.
- STRIP ON—Deprecated. Use **STRIP RTRIM**.

With **STRIP** turned on (the default), SAP Sybase IQ strips trailing blanks from values before inserting them. This is effective only for `VARCHAR` data. **STRIP OFF** preserves trailing blanks.

Trailing blanks are stripped only for unquoted strings. Quoted strings retain their trailing blanks. If you do not require blank sensitivity, you can use the **FILLER** option as an alternative

to be more specific in the number of bytes to strip, instead of all the trailing spaces. **STRIP OFF** is more efficient for SAP Sybase IQ, and it adheres to the ANSI standard when dealing with trailing blanks. (CHAR data is always padded, so the **STRIP** option only affects VARCHAR data.)

The STRIP option applies only to variable-length non-binary data and does not apply to ASCII fixed-width inserts. For example, assume this schema:

```
CREATE TABLE t( c1 VARCHAR(3) );
LOAD TABLE t( c1 ',' ) ........ STRIP RTRIM    // trailing blanks
trimmed

LOAD TABLE t( c1 ',' ) ........ STRIP OFF     // trailing blanks not
trimmed

LOAD TABLE t( c1 ASCII(3) ) ... STRIP RTRIM    // trailing blanks not
trimmed
LOAD TABLE t( c1 ASCII(3) ) ... STRIP OFF      // trailing blanks
trimmed

LOAD TABLE t( c1 BINARY ) ..... STRIP RTRIM    // trailing blanks
trimmed
LOAD TABLE t( c1 BINARY ) ..... STRIP OFF      // trailing blanks
trimmed
```

Trailing blanks are always trimmed from binary data.

WITH CHECKPOINT—This option is useful only when loading SQL Anywhere tables in an SAP Sybase IQ database.

Use this clause to specify whether to perform a checkpoint. The default setting is OFF. If this clause is set to ON, a checkpoint is issued after successfully completing and logging the statement. If the server fails after a connection commits and before the next checkpoint, the data file used to load the table must be present for the recovery to complete successfully. However, if **WITH CHECKPOINT ON** is specified, and recovery is subsequently required, the data file need not be present at the time of recovery.

The data files are required, regardless of what is specified for this clause, if the database becomes corrupt and you need to use a backup and apply the current log file.

Warning! If you set the database option CONVERSION_ERROR to OFF, you may load bad data into your table without any error being reported. If you do not specify **WITH CHECKPOINT ON**, and the database needs to be recovered, the recovery may fail as CONVERSION_ERROR is ON (the default value) during recovery. It is recommended that you do not load tables when CONVERSION_ERROR is set to OFF and **WITH CHECKPOINT ON** is not specified.

See also *CONVERSION_ERROR Option [TSQL]*.

BYTE ORDER—Specifies the byte order during reads. This option applies to all binary input fields. If none are defined, this option is ignored. SAP Sybase IQ always reads binary data in the format native to the machine it is running on (default is **NATIVE**). You can also specify:

- **HIGH** when multibyte quantities have the high order byte first (for big endian platforms like Sun, IBM AIX, and HP).
- **LOW** when multibyte quantities have the low order byte first (for little endian platforms like Windows).

LIMIT—Specifies the maximum number of rows to insert into the table. The default is 0 for no limit. The maximum is 2^{31} - 1 (2147483647) rows.

NOTIFY—Specifies that you be notified with a message each time the specified number of rows is successfully inserted into the table. The default is every 100,000 rows. The value of this option overrides the value of the `NOTIFY_MODULUS` database option.

ON FILE ERROR—Specifies the action SAP Sybase IQ takes when an input file cannot be opened because it does not exist or you have incorrect permissions to read the file. You can specify one of the following:

- **ROLLBACK** aborts the entire transaction (the default).
- **FINISH** finishes the insertions already completed and ends the load operation.
- **CONTINUE** returns an error but only skips the file to continue the load operation.

Only one **ON FILE ERROR** clause is permitted.

PREVIEW—Displays the layout of input into the destination table including starting position, name, and data type of each column. SAP Sybase IQ displays this information at the start of the load process. If you are writing to a log file, this information is also included in the log.

ROW DELIMITED BY—Specifies a string up to 4 bytes in length that indicates the end of an input record. You can use this option only if all fields within the row are any of the following:

- Delimited with column terminators
- Data defined by the DATE or DATETIME *column-spec* options
- ASCII fixed length fields

You cannot use this option if any input fields contain binary data. With this option, a row terminator causes any missing fields to be set to NULL. All rows must have the same row delimiters, and it must be distinct from all column delimiters. The row and field delimiter strings cannot be an initial subset of each other. For example, you cannot specify “*” as a field delimiter and “*#” as the row delimiter, but you could specify “#” as the field delimiter with that row delimiter.

If a row is missing its delimiters, SAP Sybase IQ returns an error and rolls back the entire load transaction. The only exception is the final record of a file where it rolls back that row and returns a warning message. On Windows, a row delimiter is usually indicated by the newline

character followed by the carriage return character. You might need to specify this as the *delimiter-string* (see above for description) for either this option or **FILLER**.

SKIP—Defines the number of rows to skip at the beginning of the input tables for this load. The maximum number of rows to skip is 2^{31} - 1 (2147483647). The default is 0.

HEADER SKIP…HEADER DELIMITED BY—Specifies a number of lines at the beginning of the data file, including header rows, for **LOAD TABLE** to skip. All **LOAD TABLE** column specifications and other load options are ignored, until the specified number of rows is skipped.

- The number of lines to skip is greater than or equal to zero.
- Lines are determined by a 1 to 4 character delimiter string specified in the **HEADER DELIMITED BY** clause. The default **HEADER DELIMITED BY** string is the '\n' character.
- The **HEADER DELIMITED BY** string has a maximum length of four characters. An error is returned, if the string length is greater than four or less than one.
- When a non-zero **HEADER SKIP** value is specified, all data inclusive of the **HEADER DELIMITED BY** delimiter is ignored, until the delimiter is encountered the number of times specified in the **HEADER SKIP** clause.
- All **LOAD TABLE** column specifications and other load options are ignored, until the specified number of rows has been skipped. After the specified number of rows has been skipped, the **LOAD TABLE** column specifications and other load options are applied to the remaining data.
- The "header" bytes are ignored only at the beginning of the data. When multiple files are specified in the **USING** clause, **HEADER SKIP** only ignores data starting from the first row of the first file, until it skips the specified number of header rows, even if those rows exist in subsequent files. **LOAD TABLE** does not look for headers once it starts parsing actual data.
- No error is reported, if **LOAD TABLE** processes all input data before skipping the number of rows specified by **HEADER SKIP**.

WORD SKIP—Allows the load to continue when it encounters data longer than the limit specified when the word index was created.

If a row is not loaded because a word exceeds the maximum permitted size, a warning is written to the `.iqmsg` file. WORD size violations can be optionally logged to the MESSAGE LOG file and rejected rows logged to the ROW LOG file specified in the **LOAD TABLE** statement.

- If the option is not specified, **LOAD TABLE** reports an error and rolls back on the first occurrence of a word that is longer than the specified limit.
- *number* specifies the number of times the "`Words exceeding the maximum permitted word length not supported`" error is ignored.
- 0 (zero) means there is no limit.

ON PARTIAL INPUT ROW—Specifies the action to take when a partial input row is encountered during a load. You can specify one of the following:

- **CONTINUE** issues a warning and continues the load operation. This is the default.
- **ROLLBACK** aborts the entire load operation and reports the error.

```
Partial input record skipped at EOF.
SQLSTATE: QDC32    SQLSTATE: -1000232L
```

IGNORE CONSTRAINT—Specifies whether to ignore CHECK, UNIQUE, NULL, DATA VALUE, and FOREIGN KEY integrity constraint violations that occur during a load and the maximum number of violations to ignore before initiating a rollback. Specifying each *constrainttype* has the following result:

- CHECK *limit*—If *limit* specifies zero, the number of CHECK constraint violations to ignore is infinite. If CHECK is not specified, the first occurrence of any CHECK constraint violation causes the **LOAD** statement to roll back. If *limit* is nonzero, then the *limit* +1 occurrence of a CHECK constraint violation causes the load to roll back.
- UNIQUE *limit*—If *limit* specifies zero, then the number of UNIQUE constraint violations to ignore is infinite. If *limit* is nonzero, then the *limit* +1 occurrence of a UNIQUE constraint violation causes the load to roll back.
- NULL *limit*—If *limit* specifies zero, then the number of NULL constraint violations to ignore is infinite. If *limit* is nonzero, then the *limit* +1 occurrence of a NULL constraint violation causes the load to roll back.
- FOREIGN KEY *limit*—If *limit* specifies zero, the number of FOREIGN KEY constraint violations to ignore is infinite. If *limit* is nonzero, then the *limit* +1 occurrence of a FOREIGN KEY constraint violation causes the load to roll back.
- DATA VALUE *limit*—If the database option CONVERSION_ERROR = ON, an error is reported and the statement rolls back. If *limit* specifies zero, then the number of DATA VALUE constraint violations (data type conversion errors) to ignore is infinite. If *limit* is nonzero, then the *limit* +1 occurrence of a DATA VALUE constraint violation causes the load to roll back.
- ALL *limit*—If the database option `CONVERSION_ERROR = ON`, an error is reported and the statement rolls back. If *limit* specifies zero, then the cumulative total of all integrity constraint violations to ignore is infinite. If *limit* is nonzero, then load rolls back when the cumulative total of all ignored UNIQUE, NULL, DATA VALUE, and FOREIGN KEY integrity constraint violations exceeds the value of *limit*. For example, you specify this **IGNORE CONSTRAINT** option:

  ```
  IGNORE CONSTRAINT NULL 50, UNIQUE 100, ALL 200
  ```

  The total number of integrity constraint violations cannot exceed 200, whereas the total number of NULL and UNIQUE constraint violations cannot exceed 50 and 100, respectively. Whenever any of these limits is exceeded, the **LOAD TABLE** statement rolls back.

Note: A single row can have more than one integrity constraint violation. Every occurrence of an integrity constraint violation counts towards the limit of that type of violation.

Tip: Set the **IGNORE CONSTRAINT** option limit to a nonzero value if you are logging the ignored integrity constraint violations. Logging an excessive number of violations affects the performance of the load.

If CHECK, UNIQUE, NULL, or FOREIGN KEY is not specified in the **IGNORE CONSTRAINT** clause, then the load rolls back on the first occurrence of each of these types of integrity constraint violation.

If DATA VALUE is not specified in the **IGNORE CONSTRAINT** clause, then the load rolls back on the first occurrence of this type of integrity constraint violation, unless the database option `CONVERSION_ERROR = OFF`. If `CONVERSION_ERROR = OFF`, a warning is reported for any DATA VALUE constraint violation and the load continues.

When the load completes, an informational message regarding integrity constraint violations is logged in the `.iqmsg` file. This message contains the number of integrity constraint violations that occurred during the load and the number of rows that were skipped.

MESSAGE LOG—Specifies the names of files in which to log information about integrity constraint violations and the types of violations to log. Timestamps indicating the start and completion of the load are logged in both the **MESSAGE LOG** and the **ROW LOG** files. Both **MESSAGE LOG** and **ROW LOG** must be specified, or no information about integrity violations is logged.

- If the **ONLY LOG** clause is not specified, no information on integrity constraint violations is logged. Only the timestamps indicating the start and completion of the load are logged.
- Information is logged on all integrity constraint-type violations specified in the **ONLY LOG** clause or for all word index-length violations if the keyword WORD is specified.
- If constraint violations are being logged, every occurrence of an integrity constraint violation generates exactly one row of information in the **MESSAGE LOG** file.

  The number of rows (errors reported) in the **MESSAGE LOG** file can exceed the **IGNORE CONSTRAINT** option limit, because the load is performed by multiple threads running in parallel. More than one thread might report that the number of constraint violations has exceeded the specified limit.
- If constraint violations are being logged, exactly one row of information is logged in the **ROW LOG** file for a given row, regardless of the number of integrity constraint violations that occur on that row.

  The number of distinct errors in the **MESSAGE LOG** file might not exactly match the number of rows in the **ROW LOG** file. The difference in the number of rows is due to the parallel processing of the load described above for the **MESSAGE LOG**.
- The **MESSAGE LOG** and **ROW LOG** files cannot be raw partitions or named pipes.
- If the **MESSAGE LOG** or **ROW LOG** file already exists, new information is appended to the file.
- Specifying an invalid file name for the **MESSAGE LOG** or **ROW LOG** file generates an error.

- Specifying the same file name for the **MESSAGE LOG** and **ROW LOG** files generates an error.

Various combinations of the **IGNORE CONSTRAINT** and **MESSAGE LOG** options result in different logging actions.

Table 12. LOAD TABLE Logging Actions

IGNORE CONSTRAINT specified?	MESSAGE LOG specified?	Action
yes	yes	All ignored integrity constraint violations are logged, including the user specified limit, before the rollback.
no	yes	The first integrity constraint violation is logged before the rollback.
yes	no	Nothing is logged.
no	no	Nothing is logged. The first integrity constraint violation causes a rollback.

Tip: Set the **IGNORE CONSTRAINT** option limit to a nonzero value, if you are logging the ignored integrity constraint violations. If a single row has more than one integrity constraint violation, a row for each violation is written to the **MESSAGE LOG** file. Logging an excessive number of violations affects the performance of the load.

LOG DELIMITED BY—Specifies the separator between data values in the **ROW LOG** file. The default separator is a comma.

SAP Sybase IQ no longer returns an error message when **FORMAT BCP** is specified as a **LOAD TABLE** clause. In addition, these conditions are verified and proper error messages are returned:

- If the specified load format is not **ASCII**, **BINARY**, or **BCP**, SAP Sybase IQ returns the message "`Only ASCII, BCP and BINARY are supported LOAD formats.`"
- If the **LOAD TABLE** column specification contains anything other than column name, **NULL**, or **ENCRYPTED**, then SAP Sybase IQ returns the error message "`Invalid load specification for LOAD ... FORMAT BCP.`"
- If the column delimiter or row terminator size for the **FORMAT BCP** load is greater than 10 characters, then SAP Sybase IQ returns the message "`Delimiter '%2' must be 1 to %3 characters in length.`" (where %3 equals 10).

  Messages corresponding to error or warning conditions which can occur for **FORMAT BCP** as well as **FORMAT ASCII** are the same for both formats.

- If the load default value specified is **AUTOINCREMENT**, **IDENTITY**, or **GLOBAL AUTOINCREMENT**, SAP Sybase IQ returns the error "`Default value %2 cannot be used as a LOAD default value. %1`"
- If the **LOAD TABLE** specification does not contain any columns that need to be loaded from the file specified, SAP Sybase IQ returns the error "`The LOAD statement must contain at least one column to be loaded from input file.`" and the **LOAD TABLE** statement rolls back.
- If a load exceeds the limit on the maximum number of terms for a text document with **TEXT** indexes, SAP Sybase IQ returns the error "`Text document exceeds maximum number of terms. Support up to 4294967295 terms per document.`"

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

The permissions required to execute a **LOAD TABLE** statement depend on the database server **-gl** command line option, as follows:

- **-gl ALL –** You must be the owner of the table, have ALTER or LOAD permission on the table, or have the ALTER ANY TABLE, LOAD ANY TALBE, or ALTER ANY OBJECT system privilege.
- **-gl DBA –** You must have the ALTER ANY TABLE, LOAD ANY TABLE, or ALTER ANY OBJECT system privilege.
- **-gl NONE –** Execution of the **LOAD TABLE** statement is not permitted.

For more information on the **-gl** command line option, please refer *Utility Guide > start_iq Database Server Startup Utility > start_iq Server Options*.

LOAD TABLE also requires a write lock on the table.

See also

- *INSERT Statement* on page 320
- *LOAD_ZEROLENGTH_ASNULL Option* on page 557
- *NON_ANSI_NULL_VARCHAR Option* on page 582

Storage Sizes

The storage size of character data, given column definition size and input data size.

Table 13. Storage Size of Character Data

Data type	Column definition	Input data	Storage
CHARACTER, CHAR	width of (32K – 1) bytes	(32K – 1) bytes	(32K – 1) bytes
VARCHAR, CHARACTER VARYING	width of (32K – 1) bytes	(32K – 1) bytes	(32K – 1) bytes

LOCK TABLE Statement

Prevents other concurrent transactions from accessing or modifying a table within the specified time.

Syntax

LOCK TABLE *table-list* [**WITH HOLD**] **IN** { **SHARE** | **WRITE | EXCLUSIVE** } **MODE** [**WAIT** *time*]

Parameters

- **table-list –** [*owner.*] *table-name* [, [*owner.*] *table-name*, …]

Examples

- **Example 1 –** Obtain a WRITE lock on the `Customers` and `Employees` tables, if available within 5 minutes and 3 seconds:

```
LOCK TABLE Customers, Employees IN WRITE MODE WAIT
'00:05:03'
```

- **Example 2 –** Wait indefinitely until the WRITE lock on the `Customers` and `Employees` tables is available, or an interrupt occurs:

```
LOCK TABLE Customers, Employees IN WRITE MODE WAIT
```

Usage

table-name—The table must be a base table, not a view. WRITE mode is only valid for IQ base tables. **LOCK TABLE** either locks all tables in the table list, or none. The table must not be enabled for row-level versioning (RLV). If obtaining a lock for a SQL Anywhere table, or when obtaining SHARE or EXCLUSIVE locks, you may only specify a single table. Standard SAP Sybase IQ object qualification rules are used to parse *table-name*.

WITH HOLD—If this clause is specified, the lock is held until the end of the connection. If the clause is not specified, the lock is released when the current transaction is committed or rolled back. Using the WITH HOLD clause in the same statement with WRITE MODE is unsupported and returns the error `SQLCODE=-131, ODBC 3 State="42000"`.

SHARE—Prevents other transactions from modifying the table, but allows them read access. In this mode, you can change data in the table as long as no other transaction has locked the row being modified, either indirectly, or explicitly by using **LOCK TABLE**.

WRITE—Prevents other transactions from modifying a list of tables. Unconditionally commits the connections outermost transaction. The transaction's snapshot version is established not by the **LOCK TABLE IN WRITE MODE** statement, but by the execution of the next command processed by SAP Sybase IQ.

WRITE mode locks are released when the transaction commits or rolls back, or when the connection disconnects.

EXCLUSIVE—Prevents other transactions from accessing the table. In this mode, no other transaction can execute queries, updates of any kind, or any other action against the table.

LOCK TABLE statements run on tables in the IQ main store on the coordinator do not affect access to those tables from connections on secondary servers. For example:

On a coordinator connection, issue the command:

```
LOCK TABLE coord1 WITH HOLD IN EXCLUSIVE MODE
```

sp_iqlocks on the coordinator confirms that the table `coord1` has an exclusive (E) lock.

The result of **sp_iqlocks** run on a connection on a secondary server does not show the exclusive lock on table `coord1`. The user on this connection can see updates to table `coord1` on the coordinator.

Other connections on the coordinator can see the exclusive lock on `coord1` and attempting to select from table `coord1` from another connection on the coordinator returns `User DBA has the row in coord1 locked.`

WAIT *time*— Wait options specify maximum blocking time for all lock types. This option is mandatory when lock mode is WRITE. When a time argument is given, the server locks the specified tables only if available within the specified time. The time argument can be specified in the format *hh:nn:ss:sss*. If a date part is specified, the server ignores it and converts the argument into a timestamp. When no time argument is given, the server waits indefinitely until a WRITE lock is available or an interrupt occurs.

LOCK TABLE on views is unsupported. Attempting to lock a view acquires a shared schema lock regardless of the mode specified in the command. A shared schema lock prevents other transactions from modifying the table schema.

The Transact-SQL (T-SQL) stored procedure dialect does not support **LOCK TABLE**. For example, this statement returns `Syntax error near LOCK`:

```
CREATE PROCEDURE tproc()
AS
BEGIN
COMMIT;
LOCK TABLE t1 IN SHARE MODE
```

```
INSERT INTO t1 VALUES(30)
END
```

The Watcom-SQL stored procedure dialect supports **LOCK TABLE**. The default command delimiter is a semicolon (;). For example:

```
CREATE PROCEDURE tproc()
AS
BEGIN
COMMIT;
LOCK TABLE t1 IN SHARE MODE
INSERT INTO t1 VALUES(30)
END
```

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- SAP Sybase—Supported in Adaptive Server Enterprise. The **WITH HOLD** clause is not supported in Adaptive Server Enterprise. Adaptive Server Enterprise provides a **WAIT** clause that is not supported in SQL Anywhere.

Permissions

To lock a table in SHARE mode, SELECT privileges are required.

To lock a table in EXCLUSIVE mode, you must be the table owner or have any of the following system privileges:

- ALTER ANY OBJECT
- INSERT ANY TABLE
- UPDATE ANY TABLE
- DELETE ANY TABLE
- ALTER ANY TABLE
- LOAD ANY TABLE
- TRUNCATE ANY TABLE

.

See also

- *SELECT Statement* on page 407

LOOP Statement

Repeats the execution of a statement list.

Syntax

```
[ statement-label: ]
... [ WHILE search-condition ] LOOP
```

```
... statement-list
... END LOOP [ statement-label ]
```

Examples

- **Example 1 –** A **WHILE** loop in a procedure:

```
...
SET i = 1 ;
WHILE i <= 10 LOOP
  INSERT INTO Counters( number ) VALUES ( i ) ;
  SET i = i + 1 ;
END LOOP ;
...
```

- **Example 2 –** A labeled loop in a procedure:

```
SET i = 1;
lbl:
LOOP
  INSERT
  INTO Counters( number )
  VALUES ( i ) ;
  IF i >= 10 THEN
    LEAVE lbl ;
  END IF ;
  SET i = i + 1 ;
END LOOP lbl
```

Usage

The **WHILE** and **LOOP** statements are control statements that let you repeatedly execute a list of SQL statements while a *search-condition* evaluates to TRUE. The **LEAVE** statement can be used to resume execution at the first statement after the **END LOOP**.

If the ending *statement-label* is specified, it must match the beginning *statement-label*.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported in Adaptive Server Enterprise. The **WHILE** statement provides looping in Transact-SQL stored procedures.

Permissions

None

See also

- *FOR Statement* on page 280
- *LEAVE Statement* on page 333
- *WHILE Statement [T-SQL]* on page 451

MESSAGE Statement

Displays a message.

Syntax

```
MESSAGE expression, …
[ TYPE { INFO | ACTION | WARNING | STATUS } ]
[ TO { CONSOLE
  | CLIENT [ FOR { CONNECTION conn_id  [ IMMEDIATE ] | ALL } ]
  | [ EVENT | SYSTEM ] LOG }
  [ DEBUG ONLY ] ]
```

Parameters

- **conn_id –** *integer*

Examples

- **Example 1 –** Display the string `The current date and time,` and the current date and time, on the database server message window:

```
CREATE PROCEDURE message_test ()
BEGIN
MESSAGE 'The current date and time: ', Now();
END;
CALL message_test();
```

- **Example 2 –** To register a callback in ODBC, first declare the message handler:

```
void SQL_CALLBACK my_msgproc(
  void *    sqlca,
  unsigned char     msg_type,
  long              code,
  unsigned short    len,
  char*              msg )
{ … }
```

Install the declared message handler by calling the SQLSetConnectAttr function:

```
rc = SQLSetConnectAttr(
  dbc,
  ASA_REGISTER_MESSAGE_CALLBACK,
  (SQLPOINTER) &my_msgproc, SQL_IS_POINTER );
```

Usage

The **MESSAGE** statement displays a message, which can be any expression. Clauses can specify where the message is displayed.

The procedure issuing a **MESSAGE … TO CLIENT** statement must be associated with a connection.

For example, the message box is not displayed because the event occurs outside of a connection:

```
CREATE EVENT CheckIdleTime TYPE ServerIdle
WHERE event_condition( 'IdleTime' ) > 100
HANDLER
BEGIN
  MESSAGE 'Idle engine' type warning to client;
END;
```

However, in this example, the message is written to the server console:

```
CREATE EVENT CheckIdleTime TYPE ServerIdle
WHERE event_condition( 'IdleTime' ) > 100
HANDLER
BEGIN
  MESSAGE 'Idle engine' type warning to console;
END;
```

Valid expressions can include a quoted string or other constant, variable, or function. However, queries are not permitted in the output of a **MESSAGE** statement, even though the definition of an expression includes queries.

The **FOR** clause can be used to notify another application of an event detected on the server without the need for the application to explicitly check for the event. When the **FOR** clause is used, recipients receive the message the next time they execute a SQL statement. If the recipient is currently executing a SQL statement, the message is received when the statement completes. If the statement being executed is a stored procedure call, the message is received before the call is completed.

If an application requires notification within a short time after the message is sent and when the connection is not executing SQL statements, you can use a second connection. This connection can execute one or more **WAITFOR DELAY** statements. These statements do not consume significant resources on the server or network (as would happen with a polling approach), but permit applications to receive notification of the message shortly after it is sent.

ESQL and ODBC clients receive messages via message callback functions. In each case, these functions must be registered. To register ESQL message handlers, use the **db_register_callback** function.

ODBC clients can register callback functions using the **SQLSetConnectAttr** function.

TYPE—The **TYPE** clause has an effect only if the message is sent to the client. The client application must decide how to handle the message. Interactive SQL displays messages in these locations:

- INFO – The Message window (default).
- ACTION– A Message box with an OK button.

- WARNING – A Message box with an OK button.
- STATUS – The Messages pane.

TO—Specifies the destination of a message:

- CONSOLE – Send messages to the database server window. **CONSOLE** is the default.
- CLIENT – Send messages to the client application. Your application must decide how to handle the message, and you can use the **TYPE** as information on which to base that decision.
- LOG – Send messages to the server log file specified by the -o option.

FOR—For messages **TO CLIENT**, this clause specifies which connections receive notification about the message:

- CONNECTION conn_id – Specifies the recipient's connection ID for the message.
- IMMEDIATE – When specified, the connection receives the message within a few seconds regardless of when the SQL statement is executed.

  Typically, messages sent using the IMMEDIATE clause are delivered in less than five seconds, even if the destination connection is not making database server requests. Message delivery could be delayed if the client connection makes several requests per second, receives very large BLOB data, or if the client's message callback executes for more than a second. In addition, sending more than one IMMEDIATE message to a single connection every two seconds could delay message delivery or generate an error message. If the client connection is disconnected, a successful MESSAGE...IMMEDIATE statement may not be delivered.
- ALL – Specifies that all open connections receive the message.

DEBUG ONLY—Lets you control whether debugging messages added to stored procedures are enabled or disabled by changing the setting of the `DEBUG_MESSAGES` option. When **DEBUG ONLY** is specified, the **MESSAGE** statement is executed only when the `DEBUG_MESSAGES` option is set to ON.

Note: DEBUG ONLY messages are inexpensive when the `DEBUG_MESSAGES` option is set to OFF, so these statements can usually be left in stored procedures on a production system. However, they should be used sparingly in locations where they would be executed frequently; otherwise, they might result in a small performance penalty.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported in Adaptive Server Enterprise. The Transact-SQL **PRINT** statement provides a similar feature, and is available in SQL Anywhere.

Permissions

Must be connected to the database.

- **FOR** clause – Requires one of:
  - SERVER OPERATOR system privilege.
  - DROP CONNECTION system privilege.
- **TO EVENT LOG** or **TO SYSTEM LOG** clause – Requites the SERVER OPERATOR system privilege.

See also

- *CREATE PROCEDURE Statement* on page 159
- *WAITFOR Statement* on page 448
- *DEBUG_MESSAGES Option* on page 504

OPEN Statement [ESQL] [SP]

Opens a previously declared cursor to access information from the database.

Syntax

```
OPEN cursor-name
... [ USING [ DESCRIPTOR { sqlda-name | host-variable [, …] } ] ]
... [ WITH HOLD ]
```

Parameters

- **cursor-name –** identifier or host-variable
- **sqlda-name –** identifier

Examples

- **Example 1 –** Use of **OPEN** in Embedded SQL:

  ```
  EXEC SQL OPEN employee_cursor;
  ```

  and

  ```
  EXEC SQL PREPARE emp_stat FROM
  'SELECT EmployeeID, Surname FROM Employees WHERE name like ?';
  EXEC SQL DECLARE employee_cursor CURSOR FOR emp_stat;
  EXEC SQL OPEN employee_cursor USING :pattern;
  ```

- **Example 2 –** An example from a procedure:

  ```
  BEGIN
  DECLARE cur_employee CURSOR FOR
    SELECT Surname
    FROM Employees ;
  DECLARE name CHAR(40) ;
  OPEN cur_employee;
  LOOP
  FETCH NEXT cur_employee into name ;
     ...
  ```

```
END LOOP
CLOSE cur_employee;
END
```

Usage

By default, all cursors are automatically closed at the end of the current transaction (**COMMIT** or **ROLLBACK**). The optional **WITH HOLD** clause keeps the cursor open for subsequent transactions. The cursor remains open until the end of the current connection or until an explicit **CLOSE** statement is executed. Cursors are automatically closed when a connection is terminated.

The cursor is positioned before the first row.

A cursor declared **FOR READ ONLY** sees the version of table(s) on which the cursor is declared when the cursor is opened, not the version of table(s) at the time of the first **FETCH**.

The **USING DESCRIPTOR sqlda-name**, **host-variable**, and **BLOCK n** formats are for Embedded SQL only.

If the cursor name is specified by an identifier or string, then the corresponding **DECLARE CURSOR** statement must appear prior to the **OPEN** in the C program; if the cursor name is specified by a host variable, then the **DECLARE CURSOR** statement must execute before the **OPEN** statement.

The optional **USING** clause specifies the host variables that are bound to the placeholder bind variables in the **SELECT** statement for which the cursor has been declared.

After successful execution of the **OPEN** statement, the *sqlerrd[3]* field of the SQLCA (SQLIOESTIMATE) is filled in with an estimate of the number of input/output operations required to fetch all rows of the query. Also, the *sqlerrd[2]* field of the SQLCA (SQLCOUNT) is filled in with either the actual number of rows in the cursor (a value greater than or equal to 0), or an estimate thereof (a negative number whose absolute value is the estimate). The *sqlerrd[2]* field is the actual number of rows, if the database server can compute this value without counting the rows.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—The simple **OPEN** *cursor-name* syntax is supported by Adaptive Server Enterprise. None of the other clauses are supported in Adaptive Server Enterprise stored procedures. Open Client/Open Server supports the **USING** descriptor or host name variable syntax.

Permissions

- Must have SELECT permission on all tables in a **SELECT** statement or EXECUTE permission on the procedure in a **CALL** statement.

- When the cursor is on a **CALL** statement, **OPEN** causes the procedure to execute until the first result set (**SELECT** statement with no **INTO** clause) is encountered. If the procedure completes and no result set is found, the SQLSTATE_PROCEDURE_COMPLETE warning is set.

See also

- *CLOSE Statement [ESQL] [SP]* on page 91
- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *FETCH Statement [ESQL] [SP]* on page 276
- *PREPARE Statement [ESQL]* on page 366
- *RESUME Statement* on page 386

OUTPUT Statement [Interactive SQL]

Writes the current query results to a file.

Syntax

```
OUTPUT TO filename
[ APPEND ] [ VERBOSE ]
[ FORMAT output-format ]
[ ESCAPE CHARACTER character ]
[ DELIMITED BY string ]
[ QUOTE string [ ALL ] ]
[ COLUMN WIDTHS ( integer, … ) ]
[ HEXADECIMAL { ON | OFF | ASIS } ]
[ ENCODING encoding ]
[ WITH COLUMN NAMES ]
```

Parameters

- **output-format – TEXT** | **FIXED** | **HTML** | **SQL** | **XML**
- **encoding –** *string* or *identifier*

Examples

- **Example 1 –** Place the contents of the `Employees` table in a text file:

  ```
  SELECT * FROM Employees;
  OUTPUT TO employees.txt FORMAT TEXT
  ```

- **Example 2 –** Place the contents of the `Employees` table at the end of an existing file, and include any messages about the query in this file as well:

  ```
  SELECT * FROM Employees;
  OUTPUT TO employees.txt APPEND VERBOSE
  ```

- **Example 3 –** Export a value that contains an embedded line feed character. A line feed character has the numeric value 10, which you can represent as the string '\x0a' in a SQL statement.

  Execute this statement with **HEXADECIMAL ON**:

  ```
  SELECT 'line1\x0aline2'; OUTPUT TO file.txt HEXADECIMAL ON
  ```

  The result is a file with one line in it, containing this text:

  ```
  line10x0aline2
  ```

  Execute the same statement with **HEXADECIMAL OFF**:

  ```
  line1\x0aline2
  ```

  If you set HEXADECIMAL to **ASIS**, you get a file with two lines:

  ```
  'line1
  line2'
  ```

  Using **ASIS** generates two lines, because the embedded line feed character has been exported without being converted to a two-digit hex representation, and without a prefix.

Usage

The **OUTPUT** statement copies the information retrieved by the current query to a file.

You can specify the output format with the optional **FORMAT** clause. If no **FORMAT** clause is specified, the Interactive SQL OUTPUT_FORMAT option setting is used.

The current query is the **SELECT** or **LOAD TABLE** statement that generated the information that appears on the Results tab in the Results pane. The **OUTPUT** statement reports an error if there is no current query.

Note: OUTPUT is especially useful in making the results of a query or report available to another application, but is not recommended for bulk operations. For high-volume data movement, use the **ASCII** and **BINARY** data extraction functionality with the **SELECT** statement. The extraction functionality provides much better performance for large-scale data movement, and creates an output file you can use for loads.

APPEND—This optional keyword is used to append the results of the query to the end of an existing output file without overwriting the previous contents of the file. If the **APPEND** clause is not used, the **OUTPUT** statement overwrites the contents of the output file by default. The **APPEND** keyword is valid if the output format is TEXT, FIXED, or SQL.

VERBOSE—When the optional **VERBOSE** keyword is included, error messages about the query, the SQL statement used to select the data, and the data itself are written to the output file. If **VERBOSE** is omitted (the default), only the data is written to the file. The **VERBOSE** keyword is valid if the output format is TEXT, FIXED, or SQL.

FORMAT—Allowable output formats are:

- TEXT—The output is a TEXT format file with one row per line in the file. All values are separated by commas, and strings are enclosed in apostrophes (single quotes). The delimiter and quote strings can be changed using the **DELIMITED BY** and **QUOTE** clauses. If **ALL** is specified in the **QUOTE** clause, all values (not just strings) are quoted. TEXT is the default output format.

  Three other special sequences are also used. The two characters \n represent a newline character, \\ represents a single \, and the sequence \xDD represents the character with hexadecimal code DD.

  If you are exporting Java methods that have string return values, you must use the **HEXADECIMAL OFF** clause.
- FIXED—The output is fixed format with each column having a fixed width. The width for each column can be specified using the **COLUMN WIDTHS** clause. No column headings are output in this format.

  If **COLUMN WIDTHS** is omitted, the width for each column is computed from the data type for the column, and is large enough to hold any value of that data type. The exception is that `LONG VARCHAR` and `LONG BINARY` data defaults to 32KB.
- HTML—The output is in the Hyper Text Markup Language format.
- SQL—The output is an Interactive SQL **INPUT** statement required to recreate the information in the table.

  Note: SAP Sybase IQ does not support the **INPUT** statement. You need to edit this statement to a valid **LOAD TABLE** (or **INSERT**) statement to use it to load data back in.
- XML—The output is an XML file encoded in UTF-8 and containing an embedded DTD. Binary values are encoded in CDATA blocks with the binary data rendered as 2-hex-digit strings. The **LOAD TABLE** statement does not accept XML as a file format.

ESCAPE CHARACTER—The default escape character for characters stored as hexadecimal codes and symbols is a backslash (\), so \x0A is the line feed character, for example.

This default can be changed using the **ESCAPE CHARACTER** clause. For example, to use the exclamation mark as the escape character, enter:

```
... ESCAPE CHARACTER '!'
```

DELIMITED BY—The **DELIMITED BY** clause is for the TEXT output format only. The delimiter string is placed between columns (default comma).

QUOTE—The **QUOTE** clause is for the TEXT output format only. The quote string is placed around string values. The default is a single quote character. If ALL is specified in the **QUOTE** clause, the quote string is placed around all values, not just around strings.

COLUMN WIDTHS—The **COLUMN WIDTHS** clause is used to specify the column widths for the **FIXED** format output.

HEXADECIMAL—The **HEXADECIMAL** clause specifies how binary data is to be unloaded for the TEXT format only. When set to **ON**, binary data is unloaded in the format **0xabcd**. When set to **OFF**, binary data is escaped when unloaded (**\xab\xcd**). When set to **ASIS**, values

are written as is, that is, without any escaping—even if the value contains control characters. ASIS is useful for text that contains formatting characters such as tabs or carriage returns.

ENCODING—Specifies the encoding that is used to write the file. The **ENCODING** clause can be used only with the TEXT format.

If *encoding* is not specified, Interactive SQL determines the code page that is used to write the file as follows, where code page values occurring earlier in the list take precedence over those occurring later:

- The code page specified with the **DEFAULT_ISQL_ENCODING** option (if this option is set)
- The default code page for the computer Interactive SQL is running on

Side Effects

- In Interactive SQL, the Results tab displays only the results of the current query. All previous query results are replaced with the current query results.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *SELECT Statement* on page 407
- *DEFAULT_ISQL_ENCODING Option [Interactive SQL]* on page 509

PARAMETERS Statement [Interactive SQL]

Specifies parameters to an Interactive SQL (**dbisql**) command file.

Syntax

```
PARAMETERS parameter1, parameter2, …
```

Examples

- **Example 1 –** This **dbisql** command file takes two parameters:

```
PARAMETERS department_id, file ;
SELECT Surname
FROM Employees
```

```
WHERE DepartmentID = {department_id}
>#{file}.dat;
```

Usage

PARAMETERS specifies how many parameters there are to a command file and also names those parameters so that they can be referenced later in the command file.

Parameters are referenced by putting the named parameter into the command file where you want the parameter to be substituted:

```
{parameter1}
```

There must be no spaces between the braces and the parameter name.

If a command file is invoked with fewer than the required number of parameters, **dbisql** prompts for values of the missing parameters.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *READ Statement [Interactive SQL]* on page 373

PREPARE Statement [ESQL]

Prepares a statement to be executed later or used for a cursor.

Syntax

```
PREPARE statement-name
FROM statement [ FOR { READ ONLY | UPDATE [ OF column-name-list ] } ]
... [ DESCRIBE describe-type INTO [ [ SQL ] DESCRIPTOR ] descriptor ]
... [ WITH EXECUTE ]
```

Parameters

- **statement-name –** identifier or host-variable
- **statement –** string, or host-variable
- **describe-type –** { **ALL** | **BIND VARIABLES** | **INPUT** | **OUTPUT** | **SELECT LIST** } ... { **LONG NAMES** [[**OWNER.**]**TABLE.**]**COLUMN**] | **WITH VARIABLE RESULT** }

Examples

- **Example 1 –** Prepare a simple query:

```
EXEC SQL PREPARE employee_statement FROM
'SELECT Surname FROM Employees';
```

Usage

The **PREPARE** statement prepares a SQL statement from the *statement* and associates the prepared statement with *statement-name*.

This statement name is referenced to execute the statement, or to open a cursor if the statement is a **SELECT** statement. *statement-name* may be a host variable of type `a_sql_statement_number` defined in the `sqlca.h` header file that is automatically included. If an identifier is used for the *statement-name*, only one statement per module may be prepared with this *statement-name*.

If a host variable is used for *statement-name*, it must have the type `short int`. There is a typedef for this type in `sqlca.h` called `a_sql_statement_number`. This type is recognized by the SQL preprocessor and can be used in a **DECLARE** section. The host variable is filled in by the database during the **PREPARE** statement and need not be initialized by the programmer.

FOR UPDATE | FOR READ ONLY Defines the cursor updatability if the statement is used by a cursor. A **FOR READ ONLY** cursor cannot be used in an **UPDATE** (positioned) or a **DELETE** (positioned) operation. **FOR READ ONLY** is the default. In response to any request for a cursor that specifies **FOR UPDATE**, SAP Sybase IQ provides either a value-sensitive cursor or a sensitive cursor. Insensitive and asensitive cursors are not updatable.

If the **DESCRIBE INTO DESCRIPTOR** clause is used, the prepared statement is described into the specified descriptor. The describe type may be any of the describe types allowed in the **DESCRIBE** statement.

If the **WITH EXECUTE** clause is used, the statement is executed if and only if it is not a **CALL** or **SELECT** statement, and it has no host variables. The statement is immediately dropped after a successful execution. If **PREPARE** and **DESCRIBE** (if any) are successful but the statement cannot be executed, a warning `SQLCODE 111, SQLSTATE 01W08` is set, and the statement is not dropped.

The **DESCRIBE INTO DESCRIPTOR** and **WITH EXECUTE** clauses might improve performance, as they decrease the required client/server communication.

The **WITH VARIABLE RESULT** clause is used to describe procedures that may have more than one result set, with different numbers or types of columns.

If **WITH VARIABLE RESULT** is used, the database server sets the SQLCOUNT value after the describe to one of these values:

- 0—The result set may change: the procedure call should be described again following each **OPEN** statement.
- 1—The result set is fixed. No redescribing is required.

These statements can be prepared:

- **ALTER**
- **CALL**
- **COMMENT ON**
- **CREATE**
- **DELETE**
- **DROP**
- **GRANT**
- **INSERT**
- **REVOKE**
- **SELECT**
- **SET OPTION**

Preparing **COMMIT**, **PREPARE TO COMMIT**, and **ROLLBACK** statements is still supported for compatibility. However, perform all transaction management operations with static Embedded SQL, because certain application environments may require it. Also, other Embedded SQL systems do not support dynamic transaction management operations.

Note: Make sure that you **DROP** the statement after use. If you do not, then the memory associated with the statement is not reclaimed.

Side Effects

- Any statement previously prepared with the same name is lost.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *DESCRIBE Statement [ESQL]* on page 244
- *DROP Statement* on page 248
- *EXECUTE Statement [ESQL]* on page 269
- *OPEN Statement [ESQL] [SP]* on page 360

PRINT Statement [T-SQL]

Displays a message on the message window of the database server.

Syntax

PRINT *format-string* [, *arg-list*]

Examples

- **Example 1 –** Display a message on the server message window:

```
CREATE PROCEDURE print_test
AS
PRINT 'Procedure called successfully'
```

  This statement returns the string “Procedure called successfully” to the client:

```
EXECUTE print_test
```

- **Example 2 –** Use placeholders in the **PRINT** statement; execute these statements inside a procedure:

```
DECLARE @var1 INT, @var2 INT
SELECT @var1 = 3, @var2 = 5
PRINT 'Variable 1 = %1!, Variable 2 = %2!', @var1, @var2
```

- **Example 3 –** Use **RAISERROR** to disallow connections:

```
CREATE procedure DBA.login_check()
begin
  // Allow a maximum of 3 concurrent connections
  IF( db_property('ConnCount') > 3 ) then
  raiserror 28000
    'User %1! is not allowed to connect -- there are
      already %2! users logged on',
      current user,
      cast(db_property('ConnCount') as int)-1;
    ELSE
  call sp_login_environment;
    end if;
end
go
grant execute on DBA.login_check to PUBLIC
go
set option PUBLIC.Login_procedure='DBA.login_check'
go
```

  For an alternate way to disallow connections, use the **LOGIN_PROCEDURE** option or the **sp_iqmodifylogin** system stored procedure.

Usage

The **PRINT** statement returns a message to the client window if you are connected from an Open Client application or JDBC application. If you are connected from an Embedded SQL or ODBC application, the message displays on the database server window.

The format string can contain placeholders for the arguments in the optional argument list. These placeholders are of the form *%nn!*, where *nn* is an integer between 1 and 20.

Standards

- SQL—Transact-SQL extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

Must be connected to the database.

See also

- *MESSAGE Statement* on page 357
- *LOGIN_PROCEDURE Option* on page 560

PUT Statement [ESQL]

Inserts a row into the specified cursor.

Syntax

```
PUT cursor-name [ USING DESCRIPTOR sqlda-name
| FROM hostvar-list ] [ INTO { DESCRIPTOR into-sqlda-name
| into-hostvar-list } ] [ ARRAY :nnn ]
```

Parameters

- **cursor-name –** *identifier* or *hostvar*
- **sqlda-name –** *identifier*
- **hostvar-list –** may contain indicator variables

Examples

- **Example 1 –** Use **PUT** in Embedded SQL:

```
EXEC SQL PUT cur_employee FROM :EmployeeID, :Surname;
```

Usage

Inserts a row into the named cursor. Values for the columns are taken from the first SQLDA or the host variable list, in a one-to-one correspondence with the columns in the **INSERT** statement (for an INSERT cursor) or the columns in the select list (for a SELECT cursor).

The **PUT** statement can be used only on a cursor over an **INSERT** or **SELECT** statement that references a single table in the **FROM** clause, or that references an updatable view consisting of a single base table.

If the **sqldata** pointer in the SQLDA is the null pointer, no value is specified for that column. If the column has a DEFAULT VALUE associated with it, that is used; otherwise, a NULL value is used.

The second SQLDA or host variable list contains the results of the **PUT** statement.

The optional **ARRAY** clause can be used to carry out wide puts, which insert more than one row at a time and which might improve performance. The value *nnn* is the number of rows to be inserted. The SQLDA must contain *nnn* ***** (*columns per row*) variables. The first row is placed in SQLDA variables 0 to (*columns per row*) - 1, and so on.

Note: For scroll (values-sensitive) cursors, the inserted row appears if the new row matches the **WHERE** clause and the keyset cursor has not finished populating. For dynamic cursors, if the inserted row matches the **WHERE** clause, the row might appear. Insensitive cursors cannot be updated.

For information on putting `LONG VARCHAR` or `LONG BINARY` values into the database, see *SET statement [ESQL]*.

Side Effects

- When inserting rows into a value-sensitive (keyset-driven) cursor, the inserted rows appear at the end of the result set, even when they do not match the **WHERE** clause of the query or if an **ORDER BY** clause would normally have placed them at another location in the result set.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

Requires INSERT privilege.

See also

- *DELETE (positioned) Statement [ESQL] [SP]* on page 243
- *INSERT Statement* on page 320
- *SET Statement [ESQL]* on page 417

- *UPDATE Statement* on page 438
- *UPDATE (positioned) Statement [ESQL] [SP]* on page 442

RAISERROR Statement [T-SQL]

Signals an error and sends a message to the client.

Syntax

RAISERROR *error-number* [*format-string*] [, *arg-list*]

Examples

- **Example 1 –** Raise error 99999, which is in the range for user-defined errors, and send a message to the client:

```
RAISERROR 99999 'Invalid entry for this
column: %1!', @val
```

Usage

The **RAISERROR** statement allows user-defined errors to be signaled, and sends a message on the client.

The *error-number* is a 5-digit integer greater than 17000. The error number is stored in the global variable *@@error*.

There is no comma between the *error-number* and the *format-string* parameters. The first item following a comma is interpreted as the first item in the argument list.

If *format-string* is not supplied or is empty, the error number is used to locate an error message in the system tables. Adaptive Server Enterprise obtains messages 17000-19999 from the `SYSMESSAGES` table. In SAP Sybase IQ, this table is an empty view, so errors in this range should provide a format string. Messages for error numbers of 20000 or greater are obtained from the `SYS.SYSUSERMESSAGES` table.

The *format-string* can be up to 255 bytes long. This is the same as in Adaptive Server Enterprise.

The extended values supported by the SQL Server or Adaptive Server Enterprise **RAISERROR** statement are not supported in SAP Sybase IQ.

The format string can contain placeholders for the arguments in the optional argument list. These placeholders are of the form *%nn!*, where *nn* is an integer between 1 and 20.

Intermediate **RAISERROR** status and code information is lost after the procedure terminates. If at return time an error occurs along with the **RAISERROR**, then the error information is returned and the **RAISERROR** information is lost. The application can query intermediate **RAISERROR** statuses by examining @@error global variable at different execution points.

Standards

- SQL—Transact-SQL extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

Must be connected to the database.

See also

- *CONTINUE_AFTER_RAISERROR Option [TSQL]* on page 487
- *ON_TSQL_ERROR Option [TSQL]* on page 586

READ Statement [Interactive SQL]

Reads Interactive SQL (**dbisql**) statements from a file.

Syntax

```
READ filename [ parameter ] …
```

Examples

- **Example 1 –**

```
READ status.rpt '160'
```

- **Example 2 –**

```
READ birthday.sql [>= '1988-1-1'] [<= '1988-1-30']
```

- **Example 3 –**

```
[test1.sql]
PARAMETERS par1, par2;

BEGIN
DECLARE v_par1 int;
DECLARE v_par2 varchar(200);

SET v_par1 = {par1};
SET v_par2 = {par2};

MESSAGE STRING('PAR1 Value: ', v_par1 ) TO CLIENT;
MESSAGE STRING('PAR2 Value: ', v_par2 ) TO CLIENT;

END;
```

```
(USR1)> READ test1.sql 123 '041028'
PAR1 Value: 123
PAR2 Value: 041028
```

Note: The second parameter value 041028 must be enclosed in quotes, as *v_par2* is declared as a character data type.

Usage

The **READ** statement reads a sequence of Interactive SQL statements from the named file. This file can contain any valid Interactive SQL statement, including other **READ** statements, which can be nested to any depth.

To find the command file, Interactive SQL first searches the current directory, then the directories specified in the environment variable SQLPATH, then the directories specified in the environment variable PATH. If the named file has no file extension, Interactive SQL also searches each directory for the same file name with the extension `.sql`.

Parameters can be listed after the name of the command file. These parameters correspond to the parameters named on the **PARAMETERS** statement at the beginning of the statement file. Interactive SQL then substitutes the corresponding parameter wherever the source file contains:

```
{ parameter-name }
```

where *parameter-name* is the name of the appropriate parameter.

The parameters passed to a command file can be identifiers, numbers, quoted identifiers, or strings. When quotes are used around a parameter, the quotes are put into the text during the substitution. Parameters that are not identifiers, numbers, or strings (contain spaces or tabs) must be enclosed in square brackets (**[ ]**). This allows for arbitrary textual substitution in the command file.

SQL character literals, including character data, passed as parameters to a **READ** statement should be enclosed in quotes.

If not enough parameters are passed to the command file, Interactive SQL prompts for values for the missing parameters.

The **READ** statement also supports an **ENCODING** clause, which lets you specify the encoding that is used to read the file. The **READ** statement does not process escape characters when it reads a file. It assumes that the entire file is in the specified encoding. When running Interactive SQL, the encoding that is used to read the data is determined in the following order:

1. The encoding specified by the ENCODING clause (if this clause is specified).
2. The encoding specified by the byte order mark (BOM) in the file (if a BOM is specified).
3. The encoding specified with the default_isql_encoding option (if this option is set).
4. The default encoding for the platform you are running on. On English Windows computers, the default encoding is 1252.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *DEFAULT_ISQL_ENCODING Option [Interactive SQL]* on page 509
- *PARAMETERS Statement [Interactive SQL]* on page 365

REFRESH TEXT INDEX Statement

Refreshes a text index.

Syntax

```
REFRESH TEXT INDEX text-index-name ON [ owner.]table-name
    [ WITH {
        ISOLATION LEVEL isolation-level
      | EXCLUSIVE MODE
      | SHARE MODE } ]
    [ FORCE { BUILD | INCREMENTAL } ]
```

Parameters

- **WITH clause –** use the WITH clause to specify what kind of locks to obtain on the underlying base tables during the refresh. The types of locks obtained determine how the text index is populated and how concurrency for transactions is affected. If you do not specify the WITH clause, the default is WITH ISOLATION LEVEL READ UNCOMMITTED, regardless of any isolation level set for the connection.

  You can specify the following WITH clause options:

  - **ISOLATION LEVEL** *isolation-level* – Use WITH ISOLATION LEVEL to change the isolation level for the execution of the refresh operation.

    The original isolation level of the connection is restored at the end of the statement execution.
  - **EXCLUSIVE MODE** – Use WITH EXCLUSIVE MODE if you do not want to change the isolation level, but want to guarantee that the data is updated to be consistent with committed data in the underlying table. When using WITH EXCLUSIVE MODE, exclusive table locks are placed on the underlying base table and no other transaction can execute queries, updates, or any other action against the underlying table(s) until

the refresh operation is complete. If table locks cannot be obtained, the refresh operation fails and an error is returned.

- **SHARE MODE** Use WITH SHARE MODE to give read access on the underlying table to other transactions while the refresh operation takes place. When this clause is specified, shared table locks are obtained on the underlying base table before the refresh operation is performed and are held until the refresh operation completes.

- **FORCE clause –** use this clause to specify the refresh method. If this clause is not specified, the database server decides whether to do an incremental update or a full rebuild based on how much of the table has changed.

  - **FORCE BUILD** clause Refreshes the text index by recreating it. Use this clause to force a complete rebuild of the text index.
  - **FORCE INCREMENTAL** clause Refreshes the text index based only on what has changed in the underlying table. An incremental refresh takes less time to complete if there have not been a significant amount of updates to the underlying table. Use this clause to force an incremental update of the text index.

    An incremental refresh does not remove deleted entries from the text index. As a result, the size of the text index may be larger than expected to contain the current and historic data. Typically, this issue occurs with text indexes that are always manually refreshed with the FORCE INCREMENTAL clause. On automatically refreshed text indexes, historic data is automatically deleted when it makes up 50% of the total size of the text index.

Examples

- **Example –** The following statement refreshes a fictitious text index called `MarketingTextIndex`, forcing it to be rebuilt.

```
REFRESH TEXT INDEX MarketingTextIndex ON
GROUPO.MarketingInformation
    FORCE BUILD;
```

Usage

This statement can only be used on text indexes defined as MANUAL REFRESH or AUTO REFRESH.

When using the FORCE clause, you can examine the results of the **sa_text_index_stats** system procedure to decide whether a complete rebuild (FORCE BUILD), or incremental update (FORCE INCREMENTAL) is most appropriate.

You cannot execute the REFRESH TEXT INDEX statement on a text index that is defined as IMMEDIATE REFRESH.

For MANUAL REFRESH text indexes, use the **sa_text_index_stats** system procedure to determine whether the text index should be refreshed. Divide pending_length by doc_length, and use the percentage as a guide for deciding whether a refresh is required. To determine the type of rebuild required, use the same process for deleted_length and doc_count.

This statement cannot be executed when there are cursors opened with the WITH HOLD clause that use either statement or transaction snapshots.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- REFERENCES privilege on the table.
- You own the table.

RELEASE SAVEPOINT Statement

Releases a savepoint within the current transaction.

Syntax

```
RELEASE SAVEPOINT [ savepoint-name ]
```

Usage

The *savepoint-name* is an identifier specified on a **SAVEPOINT** statement within the current transaction. If *savepoint-name* is omitted, the most recent savepoint is released.

Releasing a savepoint does not perform any type of **COMMIT**; it simply removes the savepoint from the list of currently active savepoints.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise. A similar feature is available in an Adaptive Server Enterprise-compatible manner using nested transactions.

Permissions

There must have been a corresponding **SAVEPOINT** within the current transaction.

See also

- *ROLLBACK TO SAVEPOINT Statement* on page 404
- *SAVEPOINT Statement* on page 406

REMOVE Statement

Removes a class, a package, or a JAR file from a database. Removed classes are no longer available for use as a variable type.

Syntax

REMOVE JAVA *classes_to_remove*

Parameters

- **classes_to_remove –** { **CLASS** *java_class_name* [, *java_class_name*]… | **PACKAGE** *java_package_name* [, *java_package_name*]… | **JAR** *jar_name* [, *jar_name*]… [**RETAIN CLASSES**] }
- **jar_name –** *character_string_expression*

Examples

- **Example 1 –** Remove a Java class named “Demo” from the current database:

```
REMOVE JAVA CLASS Demo
```

Usage

Any class, package, or JAR to be removed must already be installed.

java_class_name—The name of one or more Java classes to be removed. Those classes must be installed classes in the current database.

java_package_name—The name of one or more Java packages to be removed. Those packages must be the name of packages in the current database.

jar_name—A character string value of maximum length 255.

Each *jar_name* must be equal to the *jar_name* of a retained JAR in the current database. Equality of *jar_name* is determined by the character string comparison rules of the SQL system.

If **JAR...RETAIN CLASSES** is specified, the specified JARs are no longer retained in the database, and the retained classes have no associated JAR. If **RETAIN CLASSES** is specified, this is the only action of the **REMOVE** statement.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.

- Sybase—Not supported by Adaptive Server Enterprise. A similar feature is available in an Adaptive Server Enterprise-compatible manner using nested transactions.

Permissions

Requires one of:

- MANAGE ANY EXTERNAL OBJECT system privilege.
- You own the object.

RESIGNAL Statement

Resignals an exception condition.

Syntax

RESIGNAL [*exception-name*]

Examples

- **Example 1 –** This code fragment returns all exceptions except for "Column Not Found" to the application:

```
...
DECLARE COLUMN_NOT_FOUND EXCEPTION
    FOR SQLSTATE '52003';
...
EXCEPTION
WHEN COLUMN_NOT_FOUND THEN
SET message='Column not found' ;
WHEN OTHERS THEN
RESIGNAL ;
```

Usage

Within an exception handler, **RESIGNAL** lets you quit the compound statement with the exception still active, or quit reporting another named exception. The exception is handled by another exception handler or returned to the application. Any actions by the exception handler before the **RESIGNAL** are undone.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported in Adaptive Server Enterprise. Error handling in Transact-SQL procedures is carried out using the **RAISERROR** statement.

Permissions

None

See also

- *BEGIN … END Statement* on page 81
- *SIGNAL Statement* on page 428

RESTORE DATABASE Statement

Restores an SAP Sybase IQ database backup from one or more archive devices.

Syntax

Syntax 1

```
RESTORE DATABASE 'db_file'
FROM 'archive_device' [ FROM 'archive_device' ]…
… [ CATALOG ONLY ]
… [ KEY key_spec ]
… [ [ RENAME logical-dbfile-name TO 'new-dbspace-path']...
     | VERIFY [ COMPATIBLE ] ]
```

Syntax 2

```
RESTORE DATABASE 'database-name'
[ restore-option ... ]
FROM 'archive_device' ...
```

Parameters

- **db_file –** relative or absolute path of the database to be restored. Can be the original location, or a new location for the catalog store file.
- **key_spec –** quoted string including mixed cases, numbers, letters, and special characters. It might be necessary to protect the key from interpretation or alteration by the command shell.
- **restore-option –**

  ```
  READONLY dbspace-or-file [, … ]
  KEY key_spec
  RENAME file-name TO new-file-path ...
  ```

Examples

- **Example 1 –** This UNIX example restores the `iqdemo` database from tape devices `/dev/rmt/0` and `/dev/rmt/2` on a Sun Solaris platform. On Solaris, a RESTORE from tape must specify the use of the rewinding device. Therefore, do not include the letter 'n' after the device name, which specifies “no rewind on close.” To specify this feature with

RESTORE, use the naming convention appropriate for your UNIX platform. (Windows does not support this feature.)

```
RESTORE DATABASE 'iqdemo'
FROM '/dev/rmt/0'
FROM '/dev/rmt/2'
```

- **Example 2 –** Restore an encrypted database named `marvin` that was encrypted with the key *is!seCret*.

  ```
  RESTORE DATABASE 'marvin'
  FROM 'marvin_bkup_file1'
  FROM 'marvin_bkup_file2'
  FROM 'marvin_bkup_file3'
  KEY 'is!seCret'
  ```

- **Example 3 –** This example shows the syntax of a **BACKUP** statement and two possible **RESTORE** statements. (This example uses objects in the `iqdemo` database for illustration purposes. Note that `iqdemo` includes a sample user dbspace named `iq_main` that may not be present in your database.)

  Given this **BACKUP** statement:

  ```
  BACKUP DATABASE READONLY DBSPACES iq_main
  TO '/system1/IQ16/demo/backup/iqmain'
  ```

  The dbspace `iq_main` can be restored using either of these **RESTORE** statements:

  ```
  RESTORE DATABASE 'iqdemo' READONLY DBSPACES iq_main
  FROM '/system1/IQ16/demo/backup/iqmain'
  ```

  or

  ```
  RESTORE DATABASE 'iqdemo'
  FROM '/system1/IQ16/demo/backup/iqmain'
  ```

  A selective backup backs up either all READWRITE dbspaces or specific read-only dbspaces or dbfiles. Selective backups are a subtype of either full or incremental backups.

  Notes:

  - You can take a **READONLY** selective backup and restore all objects from this backup (as in the second example above).
  - You can take an all-inclusive backup and restore read-only files and dbspaces selectively.
  - You can take a **READONLY** selective backup of multiple read-only files and dbspaces and restore a subset of read-only files and dbspaces selectively. See *Permissions*.
  - You can restore the read-only backup, only if the read-only files have not changed since the backup. Once the dbspace is made read-write again, the read-only backup is invalid, unless you restore the entire read-write portion of the database back to the point at which the read-only dbspace was read-only.
  - Decide which backup subtype to use (either selective or non-selective) and use it consistently. If you must switch from a non-selective to a selective backup, or vice

versa, always take a non-selective full backup before switching to the new subtype, to ensure that you have all changes.

- **Example 4 –** Syntax to validate the database archives using the **VERIFY** clause, without performing any write operations:

```
RESTORE DATABASE <database_name.db>
FROM '/sys1/dump/dmp1'
FROM '/sys1/dump/dmp2'
VERIFY
```

When you use validate, specify a different database name to avoid `Database name not unique` errors. If the original database is `iqdemo.db`, for example, use `iq_demo_new.db` instead:

```
RESTORE DATABASE iqdemo_new.db FROM iqdemo.bkp VERIFY
```

Usage

The **RESTORE** command requires exclusive access by a user with the SERVER OPERATOR system privilege to the database. This exclusive access is achieved by setting the **-gd** switch to `DBA`, which is the default when you start the server engine.

Issue the **RESTORE** command before you start the database (you must be connected to the `utility_db` database). Once you finish specifying **RESTORE** commands for the type of backup, that database is ready to be used. The database is left in the state that existed at the end of the first implicit **CHECKPOINT** of the last backup you restored. You can now specify a **START DATABASE** to allow other users to access the restored database.

The maximum size for a complete **RESTORE** command, including all clauses, is 32KB.

When restoring to a raw device, make sure the device is large enough to hold the dbspace you are restoring. SAP Sybase IQ **RESTORE** checks the raw device size and returns an error, if the raw device is not large enough to restore the dbspace.

BACKUP allows you to specify full or incremental backups. There are two kinds of incremental backups. **INCREMENTAL** backs up only those blocks that have changed and committed since the last backup of any type (incremental or full). **INCREMENTAL SINCE FULL** backs up all the blocks that have changed since the last full backup. If a **RESTORE** of a full backup is followed by one or more incremental backups (of either type), no modifications to the database are allowed between successive **RESTORE** commands. This rule prevents a **RESTORE** from incremental backups on a database in need of crash recovery, or one that has been modified. You can still overwrite such a database with a **RESTORE** from a full backup.

Before starting a full restore, you must delete two files: the catalog store file (default name `dbname.db`) and the transaction log file (default name `dbname.log`).

If you restore an incremental backup, **RESTORE** ensures that backup media sets are accessed in the proper order. This order restores the last full backup tape set first, then the first incremental backup tape set, then the next most recent set, and so forth, until the most recent incremental backup tape set. If a user with the SERVER OPERATOR system privilege

produced an **INCREMENTAL SINCE FULL** backup, only the full backup tape set and the most recent **INCREMENTAL SINCE FULL** backup tape set is required; however, if there is an **INCREMENTAL** backup made since the **INCREMENTAL SINCE FULL** backup, it also must be applied.

SAP Sybase IQ ensures that the restoration order is appropriate, or it displays an error. Any other errors that occur during the restore results in the database being marked corrupt and unusable. To clean up a corrupt database, do a **RESTORE** from a full backup, followed by any additional incremental backups. Since the corruption probably happened with one of those backups, you might need to ignore a later backup set and use an earlier set.

To restore read-only files or dbspaces from an archive backup, the database may be running and the administrator may connect to the database when issuing the **RESTORE** statement. The read-only file pathname need not match the names in the backup, if they otherwise match the database system table information.

The database must not be running to restore a **FULL**, **INCREMENTAL SINCE FULL**, or **INCREMENTAL** restore of either a **READWRITE FILES ONLY** or an all files backup. The database may or may not be running to restore a backup of read-only files. When restoring specific files in a read-only dbspace, the dbspace must be offline. When restoring read-only files in a read-write dbspace, the dbspace can be online or offline. The restore closes the read-only files, restores the files, and reopens those files at the end of the restore.

You can use selective restore to restore a read-only dbspace, as long as the dbspace is still in the same read-only state.

FROM—Specifies the name of the *archive_device* from which you are restoring, delimited with single quotation marks. If you are using multiple archive devices, specify them using separate **FROM** clauses. A comma-separated list is not allowed. Archive devices must be distinct. The number of **FROM** clauses determines the amount of parallelism SAP Sybase IQ attempts with regard to input devices.

The backup/restore API DLL implementation lets you specify arguments to pass to the DLL when opening an archive device. For third-party implementations, the *archive_device* string has this format:

```
'DLLidentifier::vendor_specific_information'
```

A specific example is:

```
'spsc::workorder=12;volname=ASD002'
```

The *archive_device* string length can be up to 1023 bytes. The *DLLidentifier* portion must be 1 to 30 bytes in length and can contain only alphanumeric and underscore characters. The *vendor_specific_information* portion of the string is passed to the third-party implementation without checking its contents.

Note: Only certain third-party products are certified with SAP Sybase IQ using this syntax. See the *Release Bulletin* for additional usage instructions or restrictions. Before using any third-party product to back up your SAP Sybase IQ database, make sure it is certified. See the

Release Bulletin, or see the Sybase Certification Reports for the SAP Sybase IQ product in *Technical Documents*.

For the Sybase implementation of the backup/restore API, you need not specify information other than the tape device name or file name. However, if you use disk devices, you must specify the same number of archive devices on the **RESTORE** as given on the backup; otherwise, you may have a different number of restoration devices than the number used to perform the backup. A specific example of an archive device for the Sybase API DLL that specifies a nonrewinding tape device for a UNIX system is:

```
'/dev/rmt/0n'
```

CATALOG ONLY—Restores only the backup header record from the archive media.

RENAME—Restore one or more SAP Sybase IQ database files to a new location. Specify each *dbspace-name* you are moving as it appears in the `SYSFILE` table. Specify *new-dbspace-path* as the new raw partition, or the new full or relative path name, for that dbspace.

If relative paths were used to create the database files, the files are restored by default relative to the catalog store file (the `SYSTEM` dbspace), and a rename clause is not required. If absolute paths were used to create the database files and a rename clause is not specified for a file, it is restored to its original location.

Relative path names in the **RENAME** clause work as they do when you create a database or dbspace: the main IQ store dbspace, temporary store dbspaces, and Message Log are restored relative to the location of `db_file` (the catalog store); user-created IQ store dbspaces are restored relative to the directory that holds the main IQ dbspace.

Do not use the **RENAME** clause to move the `SYSTEM` dbspace, which holds the catalog store. To move the catalog store, and any files created relative to it and not specified in a **RENAME** clause, specify a new location in the *db_file* parameter.

VERIFY [COMPATIBLE]— Directs the server to validate the specified SAP Sybase IQ database backup archives for a full, incremental, incremental since full, or virtual backup. The backup must be SAP Sybase IQ version 12.6 or later. The verification process checks the specified archives for the same errors a restore process checks, but performs no write operations. All status messages and detected errors are written to the server log file.

You cannot use the **RENAME** clause with the **VERIFY** clause; an error is reported.

The backup verification process can run on a different host than the database host. You must have the BACKUP DATABASE system privilege to run **RESTORE VERIFY**.

If the **COMPATIBLE** clause is specified with **VERIFY**, the compatibility of an incremental archive is checked with the existing database files. If the database files do not exist on the system on which **RESTORE…VERIFY COMPATIBLE** is invoked, an error is returned. If **COMPATIBLE** is specified while verifying a full backup, the keyword is ignored; no compatibility checks need to be made while restoring a full backup.

You must have the database and log files (`.db` and `.log`) to validate the backup of a read-only dbspace within a full backup. If you do not have these files, validate the entire backup by running **RESTORE…VERIFY** without the **READONLY** *dbspace* clause.

Note: The verification of a backup archive is different than the database consistency checker (DBCC) verify mode (`sp_iqcheckdb 'verify...'`). **RESTORE VERIFY** validates the consistency of the backup archive to be sure it can be restored, whereas DBCC validates the consistency of the database data.

Run `sp_iqcheckdb 'verify...'` before taking a backup. If an inconsistent database is backed up, then restored from the same backup archive, the data continues to be in an inconsistent state, even if **RESTORE VERIFY** reports a successful validation.

Other **RESTORE** issues:

- **RESTORE** to disk does not support raw devices as archival devices.
- SAP Sybase IQ does not rewind tapes before using them; on rewinding tape devices, it does rewind tapes after using them. You must position each tape to the start of the SAP Sybase IQ data before starting the **RESTORE**.
- During **BACKUP** and **RESTORE** operations, if SAP Sybase IQ cannot open the archive device (for example, when it needs the media loaded) and the ATTENDED option is ON, it waits for ten seconds for you to put the next tape in the drive, and then tries again. It continues these attempts indefinitely until either it is successful or the operation is terminated with Ctrl+C.
- If you press Ctrl+C, **RESTORE** fails and returns the database to its state before the restoration began.
- If disk striping is used, the striped disks are treated as a single device.
- The `file_name` column in the `SYSFILE` system table for the `SYSTEM` dbspace is not updated during a restore. For the `SYSTEM` dbspace, the `file_name` column always reflects the name when the database was created. The file name of the `SYSTEM` dbspace is the name of the database file.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

The permissions required to execute this statement are set using the **-gu** server command line option, as follows:

- **NONE –** No user can issue this statement.
- **DBA –** Requires the SERVER OPERATOR system privilege.

- **UTILITY_DB –** Only those users who can connect to the `utility_db` database can issue this statement.

See also

- *BACKUP Statement* on page 75

RESUME Statement

Resumes a procedure after a query.

Syntax

Syntax 1

```
RESUME cursor-name
```

Syntax 2

```
RESUME [ ALL ]
```

Parameters

- **cursor-name –** identifier
- **cursor-name –** identifier or host-variable

Examples

- **Example 1 –** Embedded SQL examples:

  ```
  EXEC SQL RESUME cur_employee;
  ```

  and

  ```
  EXEC SQL RESUME :cursor_var;
  ```

- **Example 2 – dbisql** example:

  ```
  CALL sample_proc() ;
  RESUME ALL;
  ```

Usage

The **RESUME** statement resumes execution of a procedure that returns result sets.

The procedure executes until the next result set (**SELECT** statement with no **INTO** clause) is encountered. If the procedure completes and no result set is found, the SQLSTATE_PROCEDURE_COMPLETE warning is set. This warning is also set when you **RESUME** a cursor for a **SELECT** statement.

Note: The Syntax 1 **RESUME** statement is supported in **dbisqlc**, but is invalid in **dbisql** (Interactive SQL) or when connected to the database using the SQL Anywhere JDBC driver.

The **dbisql RESUME** statement (Syntax 2) resumes the current procedure. If **ALL** is not specified, executing **RESUME** displays the next result set or, if no more result sets are returned, completes the procedure.

The **dbisql RESUME ALL** statement cycles through all result sets in a procedure, without displaying them, and completes the procedure. This is useful mainly in testing procedures.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise.

Permissions

The cursor must have been previously opened.

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233

RETURN Statement

Exits a function or procedure unconditionally, optionally providing a return value. Statements following **RETURN** are not executed.

Syntax

```
RETURN [ ( expression ) ]
```

Examples

- **Example 1 –** Return the product of three numbers:

```
CREATE FUNCTION product ( a numeric,
                b numeric ,
                c numeric)
RETURNS numeric
BEGIN
  RETURN ( a * b * c ) ;
END
```

- **Example 2 –** Calculate the product of three numbers:

```
SELECT product (2, 3, 4)
```

```
product (2,3,4)
24
```

- **Example 3 –** Avoid executing a complex query, if it is meaningless:

```
CREATE PROCEDURE customer_products
( in customer_id integer DEFAULT NULL)
```

```
RESULT ( id integer, quantity_ordered integer )
BEGIN
  IF customer_id NOT IN (SELECT ID FROM Customers)
  OR customer_id IS NULL THEN
    RETURN
  ELSE
    SELECT ID,sum(
      SalesOrderItems.Quantity )
    FROM Products,
        SalesOrderItems,
        SalesOrders
    WHERE SalesOrders.CustomerID = customer_id
    AND SalesOrders.ID = SalesOrderItems.ID
    AND SalesOrderItems.ProductID = Products.D
    GROUP BY Products.ID
  END IF
END
```

Usage

If *expression* is supplied, the value of *expression* is returned as the value of the function or procedure.

Within a function, the expression should be of the same data type as the **RETURN** data type of the function.

RETURN is used in procedures for Transact-SQL-compatibility, and is used to return an integer error code.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Transact-SQL procedures use the return statement to return an integer error code.

Permissions

None

See also

- *BEGIN … END Statement* on page 81
- *CREATE PROCEDURE Statement* on page 159

REVOKE CHANGE PASSWORD Statement

Removes the ability of a user to manage passwords and administer the system privilege.

You can revoke the CHANGE PASSWORD system privilege from any combination of users and roles granted.

Syntax

```
REVOKE [ ADMIN OPTION FOR ] CHANGE PASSWORD [(target_user_list | ANY | ANY
WITH ROLES target_role_list )]
FROM userID [,...]
```

Parameters

- **target_user_list –** if specified, must consist of existing users with login passwords and is the potential list of target users who can no longer have passwords managed by grantee users. Separate the user IDs in the list with commas.
- **ANY –** if specified, the potential list of target users for each grantee consists of all database users with login passwords.
- **ANY WITH ROLES *target_role_list* –** if specified, the *target_role_list* must consist of existing roles, and the potential list of target users for each grantee must consist of database users with login passwords that have a subset of roles in *target_role_list*. Separate the list of roles with commas.
- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Examples

- **Example 1 –** removes the ability of `Joe` to manage the passwords of `Sally` or `Bob`.

  ```
  REVOKE CHANGE PASSWORD (Sally, Bob) FROM Joe
  ```

- **Example 2 –** if the CHANGE PASSWORD system privilege was originally granted to `Sam` with the WITH ADMIN OPTION clause, this example removes the ability of `Sam` to grant the CHANGE PASSWORD system privilege to another user, but still allows `Sam` to manage passwords for those users specified in the original **GRANT CHANGE PASSWORD** statement. However, if the CHANGE PASSWORD system privilege was originally granted to `Sam` with the WITH ADMIN ONLY OPTION clause, this example removes all permissions to the system privilege from `Sam`.

  ```
  REVOKE ADMIN OPTION FOR CHANGE PASSWORD FROM Sam
  ```

Usage

Depending on how the CHANGE PASSWORD system privilege was initially granted, using the ADMIN OPTION FOR clause when revoking the CHANGE PASSWORD system privilege has different results. If the CHANGE PASSWORD system privilege was originally granted with the WITH ADMIN OPTION clause, including the ADMIN OPTION FOR clause in the revoke statement revokes only the ability to administer the CHANGE PASSWORD system privilege (that is, grant the system privilege to another user). The ability to actually manage passwords for other users remains. However, if the CHANGE PASSWORD system privilege was originally granted with the WITH ADMIN ONLY OPTION clause, including the ADMIN OPTION FOR clause in the revoke statement is

semantically equivalent to revoking the entire CHANGE PASSWORD system privilege. Finally, if the CHANGE PASSWORD system privilege was originally granted with the WITH NO ADMIN OPTION clause, and the ADMIN OPTION FOR clause is included in the revoke statement, nothing is revoked because there were no administrative rights granted in the first place.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the CHANGE PASSWORD system privilege granted with administrative rights.

See also

- *GRANT CHANGE PASSWORD Statement* on page 297

REVOKE CONNECT Statement

Removes a user from the database.

Syntax

```
REVOKE CONNECT
FROM userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Usage

- Use system procedures or CREATE USER and DROP USER statements, not **GRANT** and **REVOKE** statements, to add and remove user IDs.

  You cannot revoke the connect privileges from a user if he or she owns database objects, such as tables. Attempting to do so with a **REVOKE** statement, or **sp_droplogin** or **sp_iqdroplogin** stored procedure returns an error such as `Cannot drop a user that owns tables in runtime system.`

Standards

ANSI SQL – compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY USER system privilege.

Note: If revoking **CONNECT** permissions or revoking table permissions from another user, the target user cannot be connected to the database.

See also

- *GRANT CONNECT Statement* on page 298

REVOKE CREATE Statement

Removes CREATE permissions on the specified dbspace from the specified user IDs.

Syntax

```
REVOKE CREATE ON dbspace-name
FROM userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Examples

- **Example 1 –** revokes the CREATE privilege on dbspace `DspHist` from user `Smith`.

  ```
  REVOKE CREATE ON DspHist FROM Smith
  ```

- **Example 2 –** revokes the CREATE permission on dbspace *DspHist* from user ID `fionat` from the database.

  ```
  REVOKE CREATE ON DspHist FROM fionat
  ```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY DBSPACE system privilege.

See also

- *GRANT CREATE Statement* on page 300

REVOKE Object-Level Privilege Statement

Removes object-level privileges that were given using the **GRANT** statement.

Syntax

```
REVOKE {permission [,...]
ON [ owner.]table-name
FROM userID [,...]

permission
ALL [ PRIVILEGES ]
| ALTER
| DELETE
| INSERT
| REFERENCE [ ( column-name [, …] ) ]
| SELECT [ ( column-name [, …] ) ]
| UPDATE [ ( column-name, …) ] }
| LOAD
| TRUNCATE
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Examples

- **Example 1 –** prevents user `Dave` from inserting into the `Employees` table.

  ```
  REVOKE INSERT ON Employees FROM Dave
  ```

- **Example 2 –** prevents user `Dave` from updating the `Employees` table.

  ```
  REVOKE UPDATE ON Employees FROM Dave
  ```

Standards

- SQL–Syntax is an entry-level feature.
- Sybase–Syntax is supported in Adaptive Server Enterprise.

Permissions

You either:

- Own the table, or
- Have the MANAGE ANY OBJECT PRIVILEGE system privilege granted with the GRANT OPTION clause.

See also

- *GRANT Object-Level Privilege Statement* on page 301

REVOKE EXECUTE Statement

Removes EXECUTE permissions that were given using the **GRANT** statement.

Syntax

```
REVOKE EXECUTE ON [ owner.]procedure-name
FROM userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

- SQL—Syntax is a Persistent Stored Module feature.
- Sybase—Syntax is supported by Adaptive Server Enterprise. User management and security models are different for v and SAP Sybase IQ.

Permissions

You either:

- Own the procedure, or
- Have been granted the MANAGE ANY OBJECT PRIVILEGE system privilege.

See also

- *GRANT EXECUTE Statement* on page 303

REVOKE INTEGRATED LOGIN Statement

Removes the INTEGRATED LOGIN permissions that were given using the **GRANT** statement.

Syntax

```
REVOKE INTEGRATED LOGIN
FROM userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *GRANT INTEGRATED LOGIN Statement* on page 304

REVOKE KERBEROS LOGIN Statement

Removes KERBEROS LOGIN permissions that were given using the **GRANT** statement.

Syntax

```
REVOKE KERBEROS LOGIN
FROM userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY USER system privilege.

See also

- *GRANT KERBEROS LOGIN Statement* on page 304

REVOKE ROLE Statement

Removes a users membership in a role or his or her ability to administer the role.

Syntax

```
REVOKE [ADMIN OPTION FOR] ROLE role_name [,...]
  FROM grantee [,...]
```

```
role_name:
dbo†††
| diagnostics†††
| PUBLIC†††
| rs_systabgroup†††
| SA_DEBUG†††
| SYS†††
| SYS_AUTH_SA_ROLE
| SYS_AUTH_SSO_ROLE
| SYS_AUTH_DBA_ROLE
| SYS_AUTH_RESOURCE_ROLE
| SYS_AUTH_BACKUP_ROLE
| SYS_AUTH_VALIDATE_ROLE
| SYS_AUTH_WRITEFILE_ROLE
| SYS_AUTH_WRITEFILECLIENT_ROLE
| SYS_AUTH_READFILE_ROLE
| SYS_AUTH_READFILECLIENT_ROLE
| SYS_AUTH_PROFILE_ROLE
| SYS_AUTH_USER_ADMIN_ROLE
| SYS_AUTH_SPACE_ADMIN_ROLE
| SYS_AUTH_MULTIPLEX_ADMIN_ROLE
| SYS_AUTH_OPERATOR_ROLE
| SYS_AUTH_PERMS_ADMIN_ROLE
| SYS_REPLICATE_ADMIN_ROLE†††
| SYS_RUN_REPLICATE_ROLE†††
| SYS_SPATIAL_ADMIN_ROLE†††
| <user-defined role name>
```

†††The ADMIN OPTION FOR clause is not supported for system roles.

Parameters

- **role_name –** must already exist in the database. Separate multiple role names with commas..
- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.
- **ADMIN OPTION FOR –** each *userID* must have been granted administrative privilege over the specified *role_name*.

  Note: This clause revokes administrative privileges of the role only, not membership in the role, unless the role was originally granted with the WITH ADMIN ONLY OPTION clause. For roles granted with the WITH ADMIN ONLY OPTION clause, the ADMIN

OPTION FOR clause is optional as it is semantically equivalent to revoking membership in a role in its entirety.

Examples

- **Example 1 –** revokes the user-defined (standalone) role `Role1` from `User1`.

```
REVOKE ROLE Role1 FROM User1
```

  After you execute this command, `User1` no longer has the rights to perform any authorized tasks using any system privileges granted to `Role1`.

- **Example 2 –** revokes the ability for `User1` to administer the compatibility role SYS_AUTH_WRITEFILE_ROLE.

```
REVOKE ADMIN OPTION FOR ROLE SYS_AUTH_WRITEFILE_ROLE FROM User1
```

  User1 retains the ability to perform any authorized tasks granted by SYS_AUTH_WRITEFILE_ROLE.

Standards

- SQL – Other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – Syntax is supported in Adaptive Server Enterprise.

Permissions

Requires the MANAGE ROLES system privilege to revoke these roles:

- diagnostics
- dbo
- PUBLIC
- rs_systabgroup
- SA_DEBUG
- SYS
- SYS_RUN_REPLICATE_ROLE
- SYS_SPATIAL_ADMIN_ROLE

Requires administrative privilege over the role to revoke these roles:

- SYS_AUTH_SA_ROLE
- SYS_AUTH_SSO_ROLE
- SYS_AUTH_DBA_ROLE
- SYS_AUTH_RESOURCE_ROLE
- SYS_AUTH_BACKUP_ROLE
- SYS_AUTH_VALIDATE_ROLE

- SYS_AUTH_WRITEFILE_ROLE
- SYS_AUTH_WRITEFILECLIENT_ROLE
- SYS_AUTH_READFILE_ROLE
- SYS_AUTH_READFILECLIENT_ROLE
- SYS_AUTH_PROFILE_ROLE
- SYS_AUTH_USER_ADMIN_ROLE
- SYS_AUTH_SPACE_ADMIN_ROLE
- SYS_AUTH_MULTIPLEX_ADMIN_ROLE
- SYS_AUTH_OPERATOR_ROLE
- SYS_AUTH_PERMS_ADMIN_ROLE
- <user-defined role name>

See also

- *GRANT ROLE Statement* on page 305
- *GRANT System Privilege Statement* on page 312

REVOKE SET USER Statement

Removes the ability for one user to impersonate another user and to administer the SET USER system privilege.

Syntax

```
REVOKE [ ADMIN OPTION FOR ] SETUSER
(target_user_list | ANY | ANY WITH ROLES target_role_list ])
FROM userID [,...]
```

Parameters

- **target_user_list –** must consist of existing users with login passwords and is the potential list of target users who can no longer be impersonated by grantee users. Separate the user IDs in the list with commas.
- **ANY –** If specified, the potential list of target users for each grantee consists of all database users with login passwords.
- **ANY WITH ROLES *target_role_list* –** If specified, the *target_role_list* must consist of existing roles, and the potential list of target users for each grantee must consist of database users with login passwords that have a subset of roles in *target_role_list*. Separate the list of roles with commas.
- **userID –** Each *userID* must be the name of an existing user or immutable role. The list must consist of existing users with login passwords. Separate the userIDs in the list with commas.

Examples

- **Example 1 –** stops `Bob` from being able to impersonate `Sally` or `Bob`.

```
REVOKE SET USER (Sally, Bob) FROM Bob
```

- **Example 2 –** if the SET USER system privilege was originally granted to `Sam` with the WITH ADMIN OPTION clause, this example removes the ability of `Sam` to grant the SET USER system privilege to another user, but still allows `Sam` to impersonate those users already granted to him or her. However, if the SET USER system privilege was originally granted to `Sam` with the WITH ADMIN ONLY OPTION clause, this example removes all permissions to the system privilege from `Sam`.

```
REVOKE ADMIN OPTION FOR SET USER FROM Sam
```

Usage

Depending on how the SET USER system privilege was initially granted, using the ADMIN OPTION FOR clause when revoking the SET USER system privilege has different results. If you the SET USER system privilege was originally granted with the WITH ADMIN OPTION clause, including the ADMIN OPTION FOR clause in the revoke statement revokes only the ability to administer the SET USER system privilege (that is, grant the system privilege to another user). The ability to actually impersonate another user remains. However, if the SET USER system privilege was originally granted with the WITH ADMIN ONLY OPTION clause, including the ADMIN OPTION FOR clause in the revoke statement is semantically equivalent to revoking the entire SET USER system privilege. Finally, if the SET USER system privilege was originally grant with the WITH NO ADMIN OPTION clause, and the ADMIN OPTION FOR clause is included in the revoke statement, nothing is revoked because there were no administrative system privileges granted in the first place.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the SET USER system privilege granted with administrative rights.

See also

- *GRANT SET USER Statement* on page 310

REVOKE System Privilege Statement

Removes specific system privileges from specific users and the right to administer the privilege.

Syntax

```
REVOKE [ADMIN OPTION FOR] system_privilege [,...]
FROM userID [,...]
```

Parameters

- **system_privilege –** must be an existing system privilege.
- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.
- **ADMIN OPTION FOR –** each *system_privilege* must currently be granted to each *userID* specified with administrative privileges.

Note: This clause revokes only the administrative privileges of the system privilege; the system privilege itself remains granted. However, if the system privilege was originally granted with the WITH ADMIN ONLY OPTION clause, the ADMIN OPTION FOR clause completely revokes the system privilege. Under this scenario, use of the ADMIN OPTION FOR clause is not required to revoke administrative privileges.

Examples

- **Example 1 –** revokes the BACKUP DATABASE system privilege from user `Jim`.

```
REVOKE BACKUP DATABASE FROM Jim
```

- **Example 2 –** assuming the BACKUP DATABASE system privilege was originally granted to user `Jim` with the WITH ADMIN OPTION clause, this example revokes the ability to administer the BACKUP DATABASE system privilege from user `Jim`. The ability to perform tasks authorized by the system privilege remains. However, if the BACKUP DATABASE system privilege was originally granted to user `Jim` with the WITH ADMIN ONLY OPTION clause, this example removes all permissions to the system privilege from user `Jim`.

```
REVOKE ADMIN OPTION FOR BACKUP DATABASE FROM Jim
```

Usage

Depending on how the system privilege was initially granted, using the ADMIN OPTION FOR clause when revoking a system privilege has different results. If you the system privilege was originally granted with the WITH ADMIN OPTION clause, including the ADMIN OPTION FOR clause in the revoke statement revokes only the ability to administer the system

privilege (that is, grant the system privilege to another user). The ability to actually use the system privilege remains. However, if the system privilege was originally granted with the WITH ADMIN ONLY OPTION clause, including the ADMIN OPTION FOR clause in the revoke statement is semantically equivalent to revoking the entire system privilege. Finally, if the system privilege was originally grant with the WITH NO ADMIN OPTION clause, and the ADMIN OPTION FOR clause is included in the revoke statement, nothing is revoked because there were no administrative system privileges granted in the first place.

Standards

- SQL – other syntaxes are vendor extensions to ISO/ANSI SQL grammar.
- Sybase – syntax is not supported by Adaptive Server Enterprise.

Permissions

Requires administrative privilege over the system privilege being revoked.

See also

- *GRANT ROLE Statement* on page 305
- *GRANT System Privilege Statement* on page 312

List of All System Privileges

A list of all system privileges.

System privileges control the rights of users to perform authorized database tasks.

The following is a list of available system privileges:

- ACCESS SERVER LS system privilege
- ALTER ANY INDEX system privilege
- ALTER ANY MATERIALIZED VIEW system privilege
- ALTER ANY OBJECT system privilege
- ALTER ANY OBJECT OWNER system privilege
- ALTER ANY PROCEDURE system privilege
- ALTER ANY SEQUENCE system privilege
- ALTER ANY TABLE system privilege
- ALTER ANY TEXT CONFIGURATION system privilege
- ALTER ANY TRIGGER system privilege
- ALTER ANY VIEW system privilege
- ALTER DATABASE system privilege
- ALTER DATATYPE system privilege
- BACKUP DATABASE system privilege
- CHANGE PASSWORD system privilege

- CHECKPOINT system privilege
- COMMENT ANY OBJECT system privilege
- CREATE ANY INDEX system privilege
- CREATE ANY MATERIALIZED VIEW system privilege
- CREATE ANY OBJECT system privilege
- CREATE ANY PROCEDURE system privilege
- CREATE ANY SEQUENCE system privilege
- CREATE ANY TABLE system privilege
- CREATE ANY TEXT CONFIGURATION system privilege
- CREATE ANY TRIGGER system privilege
- CREATE ANY VIEW system privilege
- CREATE DATATYPE system privilege
- CREATE EXTERNAL REFERENCE system privilege
- CREATE MATERIALIZED VIEW system privilege
- CREATE MESSAGE system privilege
- CREATE PROCEDURE system privilege
- CREATE PROXY TABLE system privilege
- CREATE TABLE system privilege
- CREATE TEXT CONFIGURATION system privilege
- CREATE VIEW system privilege
- DEBUG ANY PROCEDURE system privilege
- DELETE ANY TABLE system privilege
- DROP ANY INDEX system privilege
- DROP ANY MATERIALIZED VIEW system privilege
- DROP ANY OBJECT system privilege
- DROP ANY PROCEDURE system privilege
- DROP ANY SEQUENCE system privilege
- DROP ANY TABLE system privilege
- DROP ANY TEXT CONFIGURATION system privilege
- DROP ANY VIEW system privilege
- DROP CONNECTION system privilege
- DROP DATATYPE system privilege
- DROP MESSAGE system privilege
- EXECUTE ANY PROCEDURE system privilege
- LOAD ANY TABLE system privilege
- INSERT ANY TABLE system privilege
- MANAGE ANY DBSPACE system privilege
- MANAGE ANY EVENT system privilege
- MANAGE ANY EXTERNAL ENVIRONMENT system privilege

- MANAGE ANY EXTERNAL OBJECT system privilege
- MANAGE ANY LDAP SERVER system privilege
- MANAGE ANY LOGIN POLICY system privilege
- MANAGE ANY MIRROR SERVER system privilege
- MANAGE ANY OBJECT PRIVILEGES system privilege
- MANAGE ANY SPATIAL OBJECT system privilege
- MANAGE ANY STATISTICS system privilege
- MANAGE ANY USER system privilege
- MANAGE ANY WEB SERVICE system privilege
- MANAGE AUDITING system privilege
- MANAGE MULTIPLEX system privilege
- MANAGE PROFILING system privilege
- MANAGE REPLICATION system privilege
- MANAGE ROLES system privilege
- MONITOR system privilege
- READ CLIENT FILE system privilege
- READ FILE system privilege
- REORGANIZE ANY OBJECT system privilege
- SELECT ANY TABLE system privilege
- SERVER OPERATOR system privilege
- SET ANY PUBLIC OPTION system privilege
- SET ANY SECURITY OPTION system privilege
- SET ANY SYSTEM OPTION system privilege
- SET ANY USER DEFINED OPTION system privilege
- SET USER system privilege (granted with ADMIN ONLY clause)
- TRUNCATE ANY TABLE system privilege
- UPDATE ANY TABLE system privilege
- UPGRADE ROLE system privilege
- USE ANY SEQUENCE system privilege
- VALIDATE ANY OBJECT system privilege
- WRITE CLIENT FILE system privilege
- WRITE FILE system privilege

REVOKE USAGE ON SEQUENCE Statement

Removes USAGE privilege on a specified sequence.

Syntax

```
REVOKE USAGE ON SEQUENCE sequence-name
  FROM userID [,...]
```

Parameters

- **userID –** must be the name of an existing user or role that has a login password. Separate multiple userIDs with commas.

Standards

- SQL – syntax is a Persistent Stored Module feature.
- Sybase – the security model is different in Adaptive Server Enterprise and SAP Sybase IQ, so other syntaxes differ.

Permissions

Requires one of:

- MANAGE ANY OBJECT PRIVILEGE system privilege.
- You own the sequence.

ROLLBACK Statement

Undoes any changes made since the last **COMMIT** or **ROLLBACK**.

Syntax

```
ROLLBACK [ WORK ]
```

Usage

ROLLBACK ends a logical unit of work (transaction) and undoes all changes made to the database during this transaction. A transaction is the database work done between **COMMIT** or **ROLLBACK** statements on one database connection.

Side Effects

- Closes all cursors not opened WITH HOLD.
- Releases locks held by the transaction issuing the **ROLLBACK**.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

Must be connected to the database.

See also

- *COMMIT Statement* on page 98
- *ROLLBACK TO SAVEPOINT Statement* on page 404

ROLLBACK TO SAVEPOINT Statement

Cancels any changes made since a **SAVEPOINT**.

Syntax

```
ROLLBACK TO SAVEPOINT [ savepoint-name ]
```

Usage

The **ROLLBACK TO SAVEPOINT** statement will undo any changes that have been made since the **SAVEPOINT** was established.

Changes made prior to the **SAVEPOINT** are not undone; they are still pending.

The *savepoint-name* is an identifier that was specified on a **SAVEPOINT** statement within the current transaction. If *savepoint-name* is omitted, the most recent savepoint is used. Any savepoints since the named savepoint are automatically released.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Savepoints are not supported by Adaptive Server Enterprise. To implement similar features in an Adaptive Server Enterprise-compatible manner, you can use nested transactions.

Permissions

There must have been a corresponding **SAVEPOINT** within the current transaction.

See also

- *RELEASE SAVEPOINT Statement* on page 377
- *ROLLBACK Statement* on page 403
- *SAVEPOINT Statement* on page 406

ROLLBACK TRANSACTION Statement [T-SQL]

Cancels any changes made since a **SAVE TRANSACTION**.

Syntax

ROLLBACK TRANSACTION [*savepoint-name*]

Examples

- **Example 1 –** Return five rows with values 10, 20, and so on. The effect of the delete, but not the prior inserts or update, is undone by the **ROLLBACK TRANSACTION** statement:

```
BEGIN
     SELECT row_num INTO #tmp
     FROM sa_rowgenerator( 1, 5 )
     UPDATE #tmp SET row_num=row_num*10
     SAVE TRANSACTION before_delete
     DELETE FROM #tmp WHERE row_num >= 3
     ROLLBACK TRANSACTION before_delete
     SELECT * FROM #tmp
END
```

Usage

ROLLBACK TRANSACTION undoes any changes that have been made since a savepoint was established using **SAVE TRANSACTION**. Changes made prior to the **SAVE TRANSACTION** are not undone; they are still pending.

The *savepoint-name* is an identifier that was specified on a **SAVE TRANSACTION** statement within the current transaction. If *savepoint-name* is omitted, all outstanding changes are rolled back. Any savepoints since the named savepoint are automatically released.

There must be a corresponding **SAVE TRANSACTION** within the current transaction.

Standards

- Vendor extension to ISO/ANSI SQL grammar.

Permissions

There must be a corresponding **SAVE TRANSACTION** within the current transaction.

See also

- *BEGIN TRANSACTION Statement [T-SQL]* on page 84
- *SAVE TRANSACTION Statement [T-SQL]* on page 406

SAVEPOINT Statement

Establishes a savepoint within the current transaction.

Syntax

```
SAVEPOINT [ savepoint-name ]
```

Usage

The *savepoint-name* is an identifier that can be used in a **RELEASE SAVEPOINT** or **ROLLBACK TO SAVEPOINT** statement.

All savepoints are automatically released when a transaction ends.

Savepoints that are established while a trigger is executing or while an atomic compound statement is executing are automatically released when the atomic operation ends.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported in Adaptive Server Enterprise. To implement similar features in an Adaptive Server Enterprise-compatible manner, use nested transactions.

Permissions

None

See also

- *RELEASE SAVEPOINT Statement* on page 377
- *ROLLBACK TO SAVEPOINT Statement* on page 404

SAVE TRANSACTION Statement [T-SQL]

Establishes a savepoint within the current transaction.

Syntax

```
SAVE TRANSACTION [ savepoint-name ]
```

Examples

- **Example 1 –** Return five rows with values 10, 20, and so on. The effect of the delete, but not the prior inserts or update, is undone by the **ROLLBACK TRANSACTION** statement.

```
BEGIN
     SELECT row_num INTO #tmp
     FROM sa_rowgenerator( 1, 5 )
     UPDATE #tmp SET row_num=row_num*10
     SAVE TRANSACTION before_delete
     DELETE FROM #tmp WHERE row_num >= 3
     ROLLBACK TRANSACTION before_delete
     SELECT * FROM #tmp
END
```

Usage

Establishes a savepoint within the current transaction. The *savepoint-name* is an identifier that can be used in a **ROLLBACK TRANSACTION** statement. All savepoints are automatically released when a transaction ends.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.

Permissions

None

See also

- *BEGIN TRANSACTION Statement [T-SQL]* on page 84
- *ROLLBACK TRANSACTION Statement [T-SQL]* on page 405

SELECT Statement

Retrieves information from the database.

Syntax

```
SELECT [ ALL | DISTINCT ] [ FIRST | TOP number-of-rows ] select-list
… [ INTO { host-variable-list | variable-list | table-name } ]
… [ INTO LOCAL TEMPORARY TABLE { table-name } ]
… [ FROM table-list ]
… [ WHERE search-condition ]
… [ GROUP BY [ expression [, …]
       | ROLLUP ( expression [, …] )
       | CUBE ( expression [, …] ) ] ]
… [ HAVING search-condition ]
… [ ORDER BY { expression | integer } [ ASC | DESC ] [, …] ]
```

```
| [ FOR JSON json-mode ]
… [ row-limitation-option ]
```

Parameters

- **select-list –**

```
{ column-name
| expression [ [ AS ] alias-name ]
| * }
```

- **row-limitation-option –**

```
LIMIT { [ offset-expression, ] limit-expression
| limit-expression OFFSET offset-expression }
```

- **limit-expression –** simple-expression
- **offset-expression –** simple-expression
- **simple-expression –**

```
integer
| variable
| ( simple-expression )
| ( simple-expression { + | - | * } simple-expression )
```

Examples

- **Example 1 –** List all tables and views in the system catalog:

```
SELECT tname
FROM SYS.SYSCATALOG
WHERE tname LIKE 'SYS%' ;
```

- **Example 2 –** List all customers and the total value of their orders:

```
SELECT CompanyName,
  CAST( sum(SalesOrderItems.Quantity *
  Products.UnitPrice) AS INTEGER) VALUE
FROM Customers
  LEFT OUTER JOIN SalesOrders
  LEFT OUTER JOIN SalesOrderItems
  LEFT OUTER JOIN Products
GROUP BY CompanyName
ORDER BY VALUE DESC
```

- **Example 3 –** List the number of employees:

```
SELECT count(*)
FROM Employees;
```

- **Example 4 –** An Embedded SQL SELECT statement:

```
SELECT count(*) INTO :size FROM Employees;
```

- **Example 5 –** List the total sales by year, model, and color:

```
SELECT year, model, color, sum(sales)
FROM sales_tab
GROUP BY ROLLUP (year, model, color);
```

- **Example 6 –** Select all items with a certain discount into a temporary table:

```
SELECT * INTO #TableTemp FROM lineitem
WHERE l_discount < 0.5
```

- **Example 7 –** Return information about the employee that appears first when employees are sorted by last name:

```
SELECT FIRST *
FROM Employees
ORDER BY Surname;
```

- **Example 8 –** Return the first five employees when their names are sorted by last name:

```
SELECT TOP 5 *
FROM Employees
ORDER BY Surname;
```

```
SELECT *
FROM Employees
ORDER BY Surname
LIMIT 5;
```

- **Example 9 –** List the fifth and sixth employees sorted in descending order by last name:

```
SELECT *
FROM Employees
ORDER BY Surname DESC
LIMIT 4,2;
```

- **Example 10 –** Return the first five employees when their names are sorted by last name:

```
CREATE OR REPLACE VARIABLE atop INT = 10;
```

```
SELECT TOP (atop -5) *
FROM Employees
ORDER BY Surname;
```

```
SELECT *
FROM Employees
ORDER BY Surname
LIMIT (atop-5);
```

- **Example 11 –** List the fifth and sixth employees sorted in descending order by last name:

```
CREATE OR REPLACE VARIABLE atop INT = 10;
```

```
SELECT *
FROM Employees
ORDER BY Surname DESC
LIMIT (atop - 8) OFFSET (atop -2 -3 -1);
```

Usage

You can use a **SELECT** statement in Interactive SQL to browse data in the database or to export data from the database to an external file.

You can also use a **SELECT** statement in procedures or in Embedded SQL. The **SELECT** statement with an **INTO** clause is used for retrieving results from the database when the **SELECT** statement returns only one row. (Tables created with **SELECT INTO** do not inherit IDENTITY/AUTOINCREMENT tables.) For multiple-row queries, you must use cursors. When you select more than one column and do not use *#table*, **SELECT INTO** creates a permanent base table. **SELECT INTO** *#table* always creates a temporary table regardless of the number of columns. **SELECT INTO** table with a single column selects into a host variable.

Note: When writing scripts and stored procedures that **SELECT INTO** a temporary table, wrap any select list item that is not a base column in a **CAST** expression. This guarantees that the column data type of the temporary table is the required data type.

Tables with the same name but different owners require aliases. A query without aliases returns incorrect results:

```
SELECT * FROM user1.t1
WHERE NOT EXISTS
(SELECT *
FROM user2.t1
WHERE user2.t1.col1 = user1.t.col1);
```

For correct results, use an alias for each table:

```
SELECT * FROM user1.t1 U1
WHERE NOT EXISTS
(SELECT *
FROM user2.t1 U2
WHERE U2.col1 = U1.col1);
```

The **INTO** clause with a *variable-list* is used only in procedures.

In **SELECT** statements, a stored procedure call can appear anywhere a base table or view is allowed. Note that CIS functional compensation performance considerations apply. For example, a **SELECT** statement can also return a result set from a procedure.

ALL or DISTINCT—If neither is specified, all rows that satisfy the clauses of the **SELECT** statement are retrieved. If **DISTINCT** is specified, duplicate output rows are eliminated. This is called the projection of the result of the statement. In many cases, statements take significantly longer to execute when **DISTINCT** is specified, so reserve the use of **DISTINCT** for cases where it is necessary.

If **DISTINCT** is used, the statement cannot contain an aggregate function with a **DISTINCT** parameter.

FIRST or TOP number-of-rows—Specifies the number of rows returned from a query. **FIRST** returns the first row selected from the query. **TOP** returns the specified number of rows from the query where *number-of-rows* is in the range 1 – 2147483647 and can be an integer constant or integer variable.

FIRST and **TOP** are used primarily with the **ORDER BY** clause. If you use these keywords without an **ORDER BY** clause, the result might vary from run to run of the same query, as the optimizer might choose a different query plan.

FIRST and **TOP** are permitted only in the top-level **SELECT** of a query, so they cannot be used in derived tables or view definitions. Using **FIRST** or **TOP** in a view definition might result in the keyword being ignored when a query is run on the view.

Using **FIRST** is the same as setting the `ROW_COUNT` database option to 1. Using **TOP** is the same as setting the `ROW_COUNT` option to the same number of rows. If both **TOP** and `ROW_COUNT` are set, then the value of **TOP** takes precedence.

The `ROW_COUNT` option could produce inconsistent results when used in a query involving global variables, system functions or proxy tables. See *ROW_COUNT Option* for details.

select-list—The *select-list* is a list of expressions, separated by commas, specifying what is retrieved from the database. If an asterisk (*) is specified, all columns of all tables in the **FROM** clause (`table-name` all columns of the named table) are selected. Aggregate functions and analytical functions are allowed in the *select-list*.

Note: In SAP Sybase IQ, scalar subqueries (nested selects) are allowed in the select list of the top level **SELECT**, as in SQL Anywhere and Adaptive Server Enterprise. Subqueries cannot be used inside a conditional value expression (for example, in a **CASE** statement).

Subqueries can also be used in a **WHERE** or **HAVING** clause predicate (one of the supported predicate types). However, inside the **WHERE** or **HAVING** clause, subqueries cannot be used inside a value expression or inside a **CONTAINS** or **LIKE** predicate. Subqueries are not allowed in the **ON** clause of outer joins or in the **GROUP BY** clause.

---

alias-names can be used throughout the query to represent the aliased expression. Alias names are also displayed by Interactive SQL at the top of each column of output from the **SELECT** statement. If the optional *alias-name* is not specified after an expression, Interactive SQL displays the expression. If you use the same name or expression for a column alias as the column name, the name is processed as an aliased column, not a table column name.

INTO host-variable-list—Used in Embedded SQL only. It specifies where the results of the **SELECT** statement goes. There must be one *host-variable* item for each item in the *select-list*. Select list items are put into the host variables in order. An indicator host variable is also allowed with each *host-variable* so the program can tell if the select list item was NULL.

INTO variable-list—Used in procedures only. It specifies where the results of the **SELECT** statement go. There must be one variable for each item in the select list. Select list items are put into the variables in order.

INTO table-name—Used to create a table and fill the table with data.

If the table name starts with #, the table is created as a temporary table. Otherwise, the table is created as a permanent base table. For permanent tables to be created, the query must satisfy these conditions:

- The *select-list* contains more than one item, and the **INTO** target is a single *table-name* identifier, or
- The select-list contains a * and the **INTO** target is specified as *owner.table*.

To create a permanent table with one column, the table name must be specified as *owner.table*. Omit the owner specification for a temporary table.

This statement causes a **COMMIT** before execution as a side effect of creating the table. Requires the CREATE TABLE system privilege to execute this statement. No permissions are granted on the new table: the statement is a short form for **CREATE TABLE** followed by **INSERT... SELECT**.

A **SELECT INTO** from a stored procedure or function is not permitted, as **SELECT INTO** is an atomic statement and you cannot do **COMMIT**, **ROLLBACK**, or some **ROLLBACK TO SAVEPOINT** statements in an atomic statement.

Tables created using this statement do not have a primary key defined. You can add a primary key using **ALTER TABLE**. A primary key should be added before applying any updates or deletes to the table; otherwise, these operations result in all column values being logged in the transaction log for the affected rows.

Use of this clause is restricted to valid SQL Anywhere queries. SAP Sybase IQ extensions are not supported.

INTO LOCAL TEMPORARY TABLE—Creates a local, temporary table and populates it with the results of the query. When you use this clause, you do not need to start the temporary table name with #.

FROM table-list—Rows are retrieved from the tables and views specified in the *table-list*. Joins can be specified using join operators. For more information, see *FROM Clause*. A **SELECT** statement with no **FROM** clause can be used to display the values of expressions not derived from tables. For example:

```
SELECT @@version
```

displays the value of the global variable @@version. This is equivalent to:

```
SELECT @@version
FROM DUMMY
```

Note: If you omit the **FROM** clause, or if all tables in the query are in the SYSTEM dbspace, the query is processed by SQL Anywhere instead of SAP Sybase IQ and might behave differently, especially with respect to syntactic and semantic restrictions and the effects of option settings.

If you have a query that does not require a **FROM** clause, you can force the query to be processed by SAP Sybase IQ by adding the clause "`FROM iq_dummy`," where `iq_dummy` is a one-row, one-column table that you create in your database.

WHERE search-condition—Specifies which rows are selected from the tables named in the **FROM** clause. It is also used to do joins between multiple tables. This is accomplished by putting a condition in the **WHERE** clause that relates a column or group of columns from one table with a column or group of columns from another table. Both tables must be listed in the **FROM** clause.

The use of the same **CASE** statement is not allowed in both the **SELECT** and the **WHERE** clause of a grouped query.

SAP Sybase IQ also supports the disjunction of subquery predicates. Each subquery can appear within the **WHERE** or **HAVING** clause with other predicates and can be combined using the AND or OR operators.

GROUP BY—You can group by columns or alias names or functions. **GROUP BY** expressions must also appear in the select list. The result of the query contains one row for each distinct set of values in the named columns, aliases, or functions. The resulting rows are often referred to as groups since there is one row in the result for each group of rows from the table list. In the case of **GROUP BY**, all NULL values are treated as identical. Aggregate functions can then be applied to these groups to get meaningful results.

GROUP BY must contain more than a single constant. You do not need to add constants to the **GROUP BY** clause to select the constants in grouped queries. If the **GROUP BY** expression contains only a single constant, an error is returned and the query is rejected.

When **GROUP BY** is used, the select list, **HAVING** clause, and **ORDER BY** clause cannot reference any identifiers except those named in the **GROUP BY** clause. This exception applies: The *select-list* and **HAVING** clause may contain aggregate functions.

ROLLUP operator—The **ROLLUP** operator in the **GROUP BY** clause lets you analyze subtotals using different levels of detail. It creates subtotals that roll up from a detailed level to a grand total.

The **ROLLUP** operator requires an ordered list of grouping expressions to be supplied as arguments. **ROLLUP** first calculates the standard aggregate values specified in the **GROUP BY**. Then **ROLLUP** moves from right to left through the list of grouping columns and creates progressively higher-level subtotals. A grand total is created at the end. If *n* is the number of grouping columns, **ROLLUP** creates *n+1* levels of subtotals.

Restrictions on the **ROLLUP** operator:

- **ROLLUP** supports all of the aggregate functions available to the **GROUP BY** clause, but **ROLLUP** does not currently support **COUNT DISTINCT** and **SUM DISTINCT**.
- **ROLLUP** can be used only in the **SELECT** statement; you cannot use **ROLLUP** in a **SELECT** subquery.

- A multiple grouping specification that combines **ROLLUP**, **CUBE**, and **GROUP BY** columns in the same **GROUP BY** clause is not currently supported.
- Constant expressions as **GROUP BY** keys are not supported.

GROUPING is used with the **ROLLUP** operator to distinguish between stored NULL values and NULL values in query results created by **ROLLUP**.

ROLLUP syntax:

```
SELECT ... [ GROUPING ( column-name ) ...] ...
GROUP BY [ expression [, ...]
| ROLLUP ( expression [, ...] ) ]
```

GROUPING takes a column name as a parameter and returns a Boolean value:

Table 14. Values Returned by GROUPING with the ROLLUP Operator

If the value of the result is	GROUPING returns
NULL created by a **ROLLUP** operation	1 (TRUE)
NULL indicating the row is a subtotal	1 (TRUE)
not created by a **ROLLUP** operation	0 (FALSE)
a stored NULL	0 (FALSE)

CUBE operator—The **CUBE** operator in the **GROUP BY** clause analyzes data by forming the data into groups in more than one dimension. **CUBE** requires an ordered list of grouping expressions (dimensions) as arguments and enables the **SELECT** statement to calculate subtotals for all possible combinations of the group of dimensions.

Restrictions on the **CUBE** operator:

- **CUBE** supports all of the aggregate functions available to the **GROUP BY** clause, but **CUBE** does not currently support **COUNT DISTINCT** or **SUM DISTINCT**.
- **CUBE** does not currently support the inverse distribution analytical functions **PERCENTILE_CONT** and **PERCENTILE_DISC**.
- **CUBE** can be used only in the **SELECT** statement; you cannot use **CUBE** in a **SELECT** subquery.
- A multiple **GROUPING** specification that combines **ROLLUP**, **CUBE**, and **GROUP BY** columns in the same **GROUP BY** clause is not currently supported.
- Constant expressions as **GROUP BY** keys are not supported.

GROUPING is used with the **CUBE** operator to distinguish between stored NULL values and NULL values in query results created by **CUBE**.

CUBE syntax:

```
SELECT ... [ GROUPING ( column-name ) ...] ...
GROUP BY [ expression [, ...]
| CUBE ( expression [, ...] ) ]
```

GROUPING takes a column name as a parameter and returns a Boolean value:

Table 15. Values Returned by GROUPING with the CUBE Operator

If the value of the result is	GROUPING returns
NULL created by a **CUBE** operation	1 (TRUE)
NULL indicating the row is a subtotal	1 (TRUE)
not created by a **CUBE** operation	0 (FALSE)
a stored NULL	0 (FALSE)

When generating a query plan, the SAP Sybase IQ optimizer estimates the total number of groups generated by the **GROUP BY CUBE** hash operation. The `MAX_CUBE_RESULTS` database option sets an upper boundary for the number of estimated rows the optimizer considers for a hash algorithm that can be run. If the actual number of rows exceeds the `MAX_CUBE_RESULT` option value, the optimizer stops processing the query and returns the error message "`Estimate number: nnn exceed the DEFAULT_MAX_CUBE_RESULT of GROUP BY CUBE or ROLLUP`", where *nnn* is the number estimated by the optimizer. See *MAX_CUBE_RESULT Option* for information on setting the `MAX_CUBE_RESULT` option.

HAVING search-condition—Based on the group values and not on the individual row values. The **HAVING** clause can be used only if either the statement has a **GROUP BY** clause or if the select list consists solely of aggregate functions. Any column names referenced in the **HAVING** clause must either be in the **GROUP BY** clause or be used as a parameter to an aggregate function in the **HAVING** clause.

ORDER BY—Orders the results of a query. Each item in the **ORDER BY** list can be labeled as ASC for ascending order or DESC for descending order. Ascending is assumed if neither is specified. If the expression is an integer **n**, then the query results are sorted by the **n**th item in the select list.

In Embedded SQL, the **SELECT** statement is used for retrieving results from the database and placing the values into host variables with the **INTO** clause. The **SELECT** statement must return only one row. For multiple row queries, you must use cursors.

You cannot include a Java class in the **SELECT** list, but you can, for example, create a function or variable that acts as a wrapper for the Java class and then select it.

FOR JSON clause specifies that the result set is to be returned in JSON format. The JSON format depends on the mode you specify. This clause cannot be used with the FOR UPDATE or FOR READ ONLY clause. Cursors declared with FOR JSON are implicitly READ ONLY.

When you specify RAW mode, each row in the result set is returned as a flattened JSON representation.

AUTO mode returns the query results as nested JSON objects based on query joins.

EXPLICIT mode allows you to control the form of the generated JSON objects. Using EXPLICIT mode offers more flexibility in specifying columns and nested hierarchical objects to produce uniform or heterogeneous arrays.

row-limitation clause—The row limitation clause allows you to return only a subset of the rows that satisfy the **WHERE** clause. Only one *row-limitation* clause can be specified at a time. When specifying this clause, an **ORDER BY** clause is required to order the rows in a meaningful manner.

The **LIMIT** and **OFFSET** arguments can be simple arithmetic expressions over host variables, integer constants, or integer variables. The **LIMIT** argument must evaluate to a value greater than or equal to 0. The **OFFSET** argument must evaluate to a value greater than or equal to 0. If *offset-expression* is not specified, the default is 0.

The row limitation clause **LIMIT** *offset-expression*, *limit-expression* is equivalent to **LIMIT** *limit-expression* **OFFSET** *offset-expression*.

The **LIMIT** keyword is disabled by default. Use the `RESERVED_KEYWORDS` option to enable the **LIMIT** keyword.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by SAP Sybase IQ, with some differences in syntax.

Permissions

Requires SELECT privilege on the named tables and views.

See also

- *CREATE VIEW Statement* on page 227
- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *FETCH Statement [ESQL] [SP]* on page 276
- *FROM Clause* on page 288
- *MAX_CUBE_RESULT Option* on page 564
- *OPEN Statement [ESQL] [SP]* on page 360
- *UNION Operation* on page 437
- *RESERVED_KEYWORDS Option* on page 607
- *ROW_COUNT Option* on page 610
- *SUBQUERY_CACHING_PREFERENCE Option* on page 621

SET Statement [ESQL]

Assigns a value to a SQL variable.

Syntax

SET *identifier = expression*

Examples

- **Example 1 –** This code fragment inserts a large text value into the database:

```
EXEC SQL BEGIN DECLARE SECTION;
char buffer[5001];
EXEC SQL END DECLARE SECTION;


EXEC SQL CREATE VARIABLE hold_text VARCHAR;
EXEC SQL SET hold_text = '';
for(;;) {
    /* read some data into buffer ... */
    size = fread( buffer, 1, 5000, fp );
    if( size <= 0 ) break;

    /* buffer must be null-terminated */
    buffer[size] = '\0';
    /* add data to blob using concatenation */
    EXEC SQL SET hold_text = hold_text || :buffer;
}
EXEC SQL INSERT INTO some_table VALUES ( 1, hold_text );
EXEC SQL DROP VARIABLE hold_text;
```

- **Example 2 –** This code fragment inserts a large binary value into the database:

```
EXEC SQL BEGIN DECLARE SECTION;
DECL_BINARY( 5000 ) buffer;
EXEC SQL END DECLARE SECTION;
EXEC SQL CREATE VARIABLE hold_blob LONG BINARY;
EXEC SQL SET hold_blob = '';
for(;;) {
    /* read some data into buffer ... */
    size = fread( &(buffer.array), 1, 5000, fp );
    if( size <= 0 ) break;
    buffer.len = size;


    /* add data to blob using concatenation
        Note that concatenation works for
        binary data too! */
    EXEC SQL SET hold_blob = hold_blob || :buffer;
}
```

```
EXEC SQL INSERT INTO some_table VALUES ( 1, hold_blob );
EXEC SQL DROP VARIABLE hold_blob;
```

Usage

The **SET** statement assigns a new value to a variable that was previously created using the **CREATE VARIABLE** statement.

You can use a variable in a SQL statement anywhere a column name is allowed. If there is no column name that matches the identifier, the database server checks to see if there is a variable that matches, and uses its value.

Variables are local to the current connection, and disappear when you disconnect from the database or when you use **DROP VARIABLE**. They are not affected by **COMMIT** or **ROLLBACK** statements.

Variables are necessary for creating large text or binary objects for **INSERT** or **UPDATE** statements from Embedded SQL programs because Embedded SQL host variables are limited to 32,767 bytes.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Not supported. In Adaptive Server Enterprise, variables are assigned using the **SELECT** statement with no table, a Transact-SQL syntax that is also supported by SAP Sybase IQ. The **SET** statement is used to set database options in Adaptive Server Enterprise.

Permissions

None

See also

- *CREATE VARIABLE Statement* on page 225
- *DROP VARIABLE Statement* on page 269

SET Statement [T-SQL]

Sets database options in an Adaptive Server Enterprise-compatible manner.

Syntax

SET *option-name option-value*

Usage

Database options in SAP Sybase IQ are set using the **SET OPTION** statement. However, SAP Sybase IQ also provides support for the Adaptive Server Enterprise **SET** statement for a set of options particularly useful for compatibility.

Table 16. Transact-SQL SET Options

Option name	Option value
ANSINULL	**ON** | **OFF**
ANSI_PERMISSIONS	**ON** | **OFF**
CLOSE_ON_ENDTRANS	**ON**
QUOTED_IDENTIFIER	**ON** | **OFF**
ROWCOUNT	*integer*
STRING_RTRUNCATION	**ON** | **OFF**
TRANSACTION ISOLATION LEVEL	**0** | **1** | **2** | **3**

You can set these options using the Transact-SQL **SET** statement in SAP Sybase IQ, as well as in Adaptive Server Enterprise:

- **SET ANSINULL { ON | OFF } –** the default behavior for comparing values to NULL in SAP Sybase IQ and Adaptive Server Enterprise is different. Setting **ANSINULL** to OFF provides Transact-SQL compatible comparisons with NULL.
- **SET ANSI_PERMISSIONS { ON | OFF } –** the default behavior in SAP Sybase IQ and Adaptive Server Enterprise regarding permissions required to carry out a **DELETE** containing a column reference is different. Setting **ANSI_PERMISSIONS** to OFF provides Transact-SQL-compatible permissions on **DELETE**.
- **SET CLOSE_ON_ENDTRANS { ON } –** when **CLOSE_ON_ENDTRANS** is set to ON (the default and only allowable value), cursors are closed at the end of a transaction. With the option set ON, **CLOSE_ON_ENDTRANS** provides Transact-SQL-compatible behavior.
- **SET QUOTED_IDENTIFIER { ON | OFF } –** controls whether strings enclosed in double quotes are interpreted as identifiers (ON) or as literal strings (OFF).
- **SET ROWCOUNT *integer* –** the Transact-SQL **ROWCOUNT** option limits to the specified integer the number of rows fetched for any cursor. This includes rows fetched by repositioning the cursor. Any fetches beyond this maximum return a warning. The option setting is considered when returning the estimate of the number of rows for a cursor on an **OPEN** request.

  Note: SAP Sybase IQ supports the *@@rowcount* global variable. **SELECT**, **INSERT**, **DELETE**, and **UPDATE** statements affect the value of the **ROWCOUNT** option. The

ROWCOUNT option has no effect on cursor operation, the **IF** statement, or creating/dropping a table or procedure.

In SAP Sybase IQ, if **ROWCOUNT** is greater than the number of rows that **dbisql** can display, **dbisql** may do extra fetches to reposition the cursor. The number of rows actually displayed may be less than the number requested. Also, if any rows are refetched due to truncation warnings, the count might be inaccurate.

A value of zero resets the option to get all rows.

- **SET STRING_RTRUNCATION { ON | OFF } –** the default behavior in SAP Sybase IQ and Adaptive Server Enterprise when nonspace characters are truncated on assigning SQL string data is different. Setting **STRING_RTRUNCATION** to ON provides Transact-SQL-compatible string comparisons, including hexadecimal string (binary data type) comparisons.
- **SET TRANSACTION ISOLATION LEVEL { 0 | 1 | 2 | 3 } –** sets the locking isolation level for the current connection For Adaptive Server Enterprise, only 1 and 3 are valid options. For SAP Sybase IQ, only 3 is a valid option.
- **SET PREFETCH { ON | OFF } –** this **SET** statement is allowed by SAP Sybase IQ for compatibility, but has no effect:

Standards

- SQL—Transact-SQL extension to ISO/ANSI SQL grammar.
- Sybase—SAP Sybase IQ supports a subset of the Adaptive Server Enterprise database options.

Permissions

None

See also

- *SET OPTION Statement* on page 422

SET CONNECTION Statement [ESQL] [Interactive SQL]

Changes the active database connection.

Syntax

```
SET CONNECTION [connection-name]
```

Parameters

- **connection-name –** identifier, string, or host-variable

Examples

- **Example 1 –** In Embedded SQL:

```
EXEC SQL SET CONNECTION :conn_name
```

- **Example 2 –** From **dbisql**, set the current connection to the connection named “conn1”:

```
SET CONNECTION conn1
```

Usage

The current connection state is saved and is resumed when it again becomes the active connection. If *connection-name* is omitted and there is a connection that was not named, that connection becomes the active connection.

Note: When cursors are opened in Embedded SQL, they are associated with the current connection. When the connection is changed, the cursor names are not accessible. The cursors remain active and in position and become accessible when the associated connection becomes active again.

Standards

- SQL— **dbisql** use is a vendor extension to ISO/ANSI SQL grammar. Embedded SQL is a full-level feature.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *CONNECT Statement [ESQL] [Interactive SQL]* on page 101
- *DISCONNECT Statement [Interactive SQL]* on page 247

SET DESCRIPTOR Statement [ESQL]

Describes the variables in a SQL descriptor area, and places data into the descriptor area.

Syntax

```
SET DESCRIPTOR descriptor-name
… { COUNT = { integer | hostvar }
| VALUE n assignment [, …] }
```

Parameters

- **assignment –** { { **TYPE** | **SCALE** | **PRECISION** | **LENGTH** | **INDICATOR** } = { *integer* | *hostvar* } | **DATA** = *hostvar* }

Examples

- **Example 1 –** See *ALLOCATE DESCRIPTOR Statement [ESQL]*.

Usage

SET...COUNT sets the number of described variables within the descriptor area. The value for count cannot exceed the number of variables specified when the descriptor area was allocated.

The value *n* specifies the variable in the descriptor area upon which the assignments are performed.

Type checking is performed when doing **SET...DATA** to ensure that the variable in the descriptor area has the same type as the host variable.

If an error occurs, the code is returned in the SQLCA.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

See also

- *ALLOCATE DESCRIPTOR Statement [ESQL]* on page 5
- *DEALLOCATE DESCRIPTOR Statement [ESQL]* on page 230

SET OPTION Statement

Changes database options.

Syntax

```
SET [ EXISTING ] [ TEMPORARY ] OPTION
… [ userid. | PUBLIC.]option-name = [ option-value ]
```

Parameters

- **userid –** identifier, string, or host-variable
- **option-name –** identifier, string, or host-variable
- **option-value –** host-variable (indicator allowed), string, identifier, or number

Examples

- **Example 1 –** Set the **DATE_FORMAT** option:

```
SET OPTION public.date_format = 'Mmm dd yyyy'
```

- **Example 2 –** Set the **WAIT_FOR_COMMIT** option to on:

```
SET OPTION wait_for_commit = 'on'
```

- **Example 3 –** Embedded SQL examples:

```
EXEC SQL SET OPTION :user.:option_name = :value;
EXEC SQL SET TEMPORARY OPTION Date_format = 'mm/dd/yyyy';
```

Usage

The **SET OPTION** statement is used to change options that affect the behavior of the database and its compatibility with Transact-SQL. Setting the value of an option can change the behavior for all users or an individual user, in either a temporary or permanent scope.

The classes of options are:

- General database options
- Transact-SQL compatibility database options

Specifying either a user ID or the `PUBLIC` user ID determines whether the option is set for an individual user, a role represented by *userid*, or the `PUBLIC` user ID (the role to which all users are a member). If the option applies to a role ID, option settings are not inherited by members of the role—the change is applied only to the role ID. If no role is specified, the option change is applied to the currently logged-in user ID that issued the **SET OPTION** statement.

For example, this statement applies an option change to the `PUBLIC` user ID:

```
SET OPTION Public.login_mode = standard
```

Only users with the SET ANY SYSTEM OPTION system privilege have the ability to set a SYSTEM option for the PUBLIC user ID. Only users with the SET ANY SECURITY OPTION system privilege have the ability to set a SECURITY option for the PUBLIC user ID.

In Embedded SQL, only database options can be set temporarily.

Changing the value of an option for the `PUBLIC` user ID sets the value of the option for any user that has not set its own value. Option values cannot be set for an individual user ID unless there is already a `PUBLIC` user ID setting for that option.

Users cannot set the options of another user, unless they have the SET ANY PUBLIC OPTION system privilege.

Users can use the **SET OPTION** statement to change the values for their own user IDs. Setting the value of an option for a user ID other than your own is permitted only if you have the SET ANY PUBLIC OPTION system privilege.

If you use the **EXISTING** keyword, option values cannot be set for an individual user ID unless there is already a `PUBLIC` user ID setting for that option.

Adding the **TEMPORARY** keyword to the **SET OPTION** statement changes the duration that the change takes effect. Without the **TEMPORARY** keyword, an option change is permanent: it does not change until it is explicitly changed using **SET OPTION**.

When **SET TEMPORARY OPTION** is applied using an individual user ID, the new option value is in effect as long as that user is logged in to the database.

When **SET TEMPORARY OPTION** is used with the `PUBLIC` user ID, the change is in place for as long as the database is running. When the database is shut down, **TEMPORARY** options for the `PUBLIC` user ID revert back to their permanent value.

Temporarily setting an option for the `PUBLIC` user ID, as opposed to setting the value of the option permanently, offers a security advantage. For example, when the `LOGIN_MODE` option is enabled, the database relies on the login security of the system on which it is running. Enabling the option temporarily means a database relying on the security of a Windows domain is not compromised if the database is shut down and copied to a local machine. In that case, the temporary enabling of `LOGIN_MODE` reverts to its permanent value, which might be Standard, a mode in which integrated logins are not permitted.

If *option-value* is omitted, the specified option setting is deleted from the database. If it was a personal option setting, the value used reverts to the PUBLIC setting. If a **TEMPORARY** option is deleted, the option setting reverts to the permanent setting.

Note: For all database options that accept integer values, SAP Sybase IQ truncates any decimal *option-value* setting to an integer value. For example, the value 3.8 is truncated to 3.

The maximum length of *option-value* when set to a string is 127 bytes.

Warning! Changing option settings while fetching rows from a cursor is not supported, as it can lead to unpredictable behavior. For example, changing the `DATE_FORMAT` setting while fetching from a cursor returns different date formats among the rows in the result set. Do not change option settings while fetching rows.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Adaptive Server Enterprise. SAP Sybase IQ does support some Adaptive Server Enterprise options using the **SET** statement.

Permissions

No specific system privileges are required to set your own options. However, the SET ANY SYSTEM OPTION system privilege is required to set system database options for PUBLIC. The SET ANY SECURITY OPTION system privilege is required to set security database options for PUBLIC. Finally, the SET ANY PUBLIC OPTION system privilege is required to set database options for another user.

See also

- *Database Options* on page 453

SET OPTION Statement [Interactive SQL]

Changes Interactive SQL (**dbisql**) options.

Syntax

Syntax 1

```
SET [ TEMPORARY ] OPTION
… [ userid. | PUBLIC.]option-name = [ option-value ]
```

Syntax 2

```
SET PERMANENT
```

Syntax 3

```
SET
```

Parameters

- **userid –** identifier, string, or host-variable
- **option-name –** identifier, string, or host-variable
- **option-value –** host-variable (indicator allowed), string, identifier, or number

Usage

SET PERMANENT (Syntax 2) stores all current **dbisql** options in the `SYSOPTION` system table. These settings are automatically established every time **dbisql** is started for the current user ID.

Syntax 3 is used to display all of the current option settings. If there are temporary options set for **dbisql** or the database server, these display; otherwise, permanent option settings are displayed.

If you incorrectly type the name of an option when you are setting the option, the incorrect name is saved in the `SYSOPTION` table. You can remove the incorrectly typed name from the

SYSOPTION table by setting the option PUBLIC with an equality after the option name and no value:

```
SET OPTION PUBLIC.a_mistyped_name=;
```

See also

- *Database Options* on page 453

SET SQLCA Statement [ESQL]

Tells the SQL preprocessor to use a SQLCA other than the default global *sqlca*.

Syntax

```
SET SQLCA sqlca
```

Parameters

- **sqlca –** identifier or string

Examples

- **Example 1 –** This function can be found in a Windows DLL. Each application that uses the DLL has its own SQLCA.

```
an_sql_code FAR PASCAL ExecuteSQL( an_application *app, char
*com )
{
    EXEC SQL BEGIN DECLARE SECTION;
    char *sqlcommand;
    EXEC SQL END DECLARE SECTION;
    EXEC SQL SET SQLCA "&app->.sqlca";
    sqlcommand = com;
    EXEC SQL WHENEVER SQLERROR CONTINUE;
    EXEC SQL EXECUTE IMMEDIATE :sqlcommand;
return( SQLCODE );
}
```

Usage

The current SQLCA pointer is implicitly passed to the database interface library on every Embedded SQL statement. All Embedded SQL statements that follow this statement in the C source file use the new SQLCA. This statement is necessary only when you are writing code that is reentrant. The *sqlca* should reference a local variable. Any global or module static variable is subject to being modified by another thread.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not supported by Open Client/Open Server.

Permissions

None

SETUSER Statement

Allows a user to temporarily assume the roles and system privileges of another user (also known as impersonation) to perform operations, provided they already have the minimum required privileges to perform the task to begin with.

Note: The SET USER system privilege is two words; the SETUSER statement is one word.

Syntax

```
SETUSER userID
```

Usage

At-least criteria validation occurs when the SETUSER statement is executed, not when the SET USER system privilege is granted.

UserID must be the name of an existing user or role that has a login password.

To terminate a successful impersonation, issue the SETUSER statement without specifying a userID.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

1. The impersonator has been granted the right to impersonate the target user.
2. The impersonator has, at minimum, all the roles and system privileges granted to the target user.
3. The impersonator has been granted the said roles and system privileges with similar or higher administrative rights.

   Note: For the purposes of meeting administrative rights criteria, the WITH ADMIN OPTION and WITH ADMIN ONLY OPTION clauses are considered to grant similar administrative rights. They are also considered to grant higher administrative rights than the WITH NO ADMIN OPTION clause. For example, User1 is granted Role1 with the

WITH ADMIN OPTION clause, User2 is granted Role1 with the WITH ADMIN ONLY clause, and User3 is granted Role1 with the WITH NO ADMIN OPTION clause. User1 and User2 are said to be granted Role1 with similar administrative rights. User1 and User2 are also said to be granted Role1 with higher administrative rights that User3.

4. If the target user has been granted a system privilege which supports extensions, the clauses used to grant the system privilege to the impersonator are a super-set of those used for the target user. Currently, only the SET USER and CHANGE PASSWORD system privileges support extensions.

Note:

- The ANY clause is considered a super-set of the *target_roles_list* and *target_users_list* clauses. If the target user has been granted the SET USER system privilege with an ANY grant, the impersonator must also have the ANY grant.
- If the target user has been granted the SET USER system privilege with both the *target_roles_list* and *target_users_list* clauses, the impersonator must also have been granted the system privilege with the two clauses, and the target list of each clause must be equal to or a super-set of the corresponding clause grant of the target user. For example, if the target lists of both the impersonator and target user contain User1, User2 and Role1, Role2, respectively, the target list grants for each clause are said to be equal. Alternately, if the target list grants of the impersonator contain User1, User2, Role1, Role2, respectively, while the target list grants of the target user contain User1, Role2 only, the target list grants of the impersonator are said to be a super-set of the target user.
- If the target user has been granted the SET USER system privilege with a single target list clause, the target list of the impersonator must be equal to or a super-set of the list of the target user. For example, the target_user_list of both the impersonator and the target user contain User1 and User2 (equal) or the impersonator list contains User1, User2, while the target user contains User2; User1, User2 (impersonator list) is a super-set of User2 (target user list).
- By definition, a user can always impersonate themselves. Therefore, if the target user has been granted the right to impersonate the impersonator, this does not violate the equal to or a super-set of criteria requirement of the impersonator. For example, User3 is the impersonator and User4 is the target user. The target_user_list for User3 contains User4 and User5. The target_user_list for User4 contains User3 and User5. If you remove the impersonator from the target list, the target list of User3 meets the criteria requirement.

SIGNAL Statement

Signals an exception condition.

Syntax

```
SIGNAL exception-name
```

Usage

SIGNAL lets you raise an exception.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—**SIGNAL** is not supported by Adaptive Server Enterprise.

Permissions

None

See also

- *BEGIN … END Statement* on page 81
- *RESIGNAL Statement* on page 379

START DATABASE Statement [Interactive SQL]

Starts a database on the specified database server.

Syntax

```
START DATABASE database-file
… [ AS database-name ]
… [ ON engine-name ]
… [ AUTOSTOP { YES | NO } ]
… [ KEY key ]
```

Examples

- **Example 1 –** On a UNIX system, start the database file `/s1/sybase/sample_2.db` on the current server:

  ```
  START DATABASE '/s1/sybase/sample_2.db'
  ```

- **Example 2 –** On a Windows system, start the database file `c:\sybase\sample_2.db` as `sam2` on the server `eng1`:

  ```
  START DATABASE 'c:\sybase\sample_2.db'
  AS sam2
  ON eng1
  ```

Usage

The database server must be running. The full path must be specified for the database file unless the file is located in the current directory.

The **START DATABASE** statement does not connect **dbisql** to the specified database: a **CONNECT** statement must be issued to make a connection.

If *database-name* is not specified, a default name is assigned to the database. This default name is the root of the database file. For example, a database in file `c:\sybase\16_0\demo\iqdemo.db` is given the default name `iqdemo`.

If *engine-name* is not specified, the default database server is assumed. The default database server is the first started server among those currently running.

The default setting for the **AUTOSTOP** clause is YES. With **AUTOSTOP** set to YES, the database is unloaded when the last connection to it is dropped. If **AUTOSTOP** is set to NO, the database is not unloaded.

If the database is strongly encrypted, enter the KEY value (password) using the **KEY** clause.

Note: Start only one database on a given SAP Sybase IQ database server.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

Requires the SERVER OPERATOR system privilege.

START ENGINE Statement [Interactive SQL]

Starts a database server.

Syntax

```
START ENGINE AS engine-name [ STARTLINE command-string ]
```

Examples

- **Example 1 –** Start a database server named `eng1` without starting any databases on it:

  ```
  START ENGINE AS eng1
  ```

- **Example 2 –** Use of the **STARTLINE** clause:

  ```
  START ENGINE AS eng1 STARTLINE 'start_iq -c 8096'
  ```

Usage

To specify a set of options for the server, use the **STARTLINE** keyword together with a command string.

Valid command strings are those that conform to the database server command line description in *start_iq Database Server Startup Utility* in the *Utility Guide*.

Note: Several server options are required for SAP Sybase IQ to operate well. To ensure that you are using the right set of options, start your server by using either Sybase Control Center or a configuration file with the **start_iq** command.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *STOP ENGINE Statement [Interactive SQL]* on page 433

START JAVA Statement

Starts the Java VM.

Syntax

```
START EXTERNAL ENVIRONMENT JAVA
```

Examples

- **Example 1 –** Start the Java VM:

```
START EXTERNAL ENVIRONMENT JAVA
```

Usage

Use **START EXTERNAL ENVIRONMENT JAVA** to load the VM at a convenient time, so that when the user starts to use Java functionality there is no initial pause while the VM is loaded.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *STOP JAVA Statement* on page 433

STOP DATABASE Statement [Interactive SQL]

Stops a database on the specified database server.

Syntax

```
STOP DATABASE database-name
… [ ON engine-name ]
… [ UNCONDITIONALLY ]
```

Examples

- **Example 1 –** Stop the database named `sample` on the default server:

```
STOP DATABASE sample
```

Usage

If *engine-name* is not specified, all running engines are searched for a database of the specified name.

The *database-name* is the name specified in the **-n** parameter when the database is started, or specified in the **DBN** (**DatabaseName**) connection parameter. This name is typically the file name of the database file that holds the catalog store, without the `.db` extension, but can be any user-defined name.

If **UNCONDITIONALLY** is supplied, the database is stopped, even if there are connections to the database. If **UNCONDITIONALLY** is not specified, the database is not stopped if there are connections to it.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

Requires the SERVER OPERATOR system privilege.

See also

- *DISCONNECT Statement [Interactive SQL]* on page 247
- *START DATABASE Statement [Interactive SQL]* on page 429

STOP ENGINE Statement [Interactive SQL]

Stops a database server.

Syntax

```
STOP ENGINE engine-name [ UNCONDITIONALLY ]
```

Examples

- **Example 1 –** Stop the database server named `sample`:

```
STOP ENGINE sample
```

Usage

If **UNCONDITIONALLY** is supplied, the database server is stopped, even if there are connections to the server. If **UNCONDITIONALLY** is not specified, the database server is not stopped if there are connections to it.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *START ENGINE Statement [Interactive SQL]* on page 430

STOP JAVA Statement

Releases resources associated with the Java VM.

Syntax

```
STOP EXTERNAL ENVIRONMENT JAVA
```

Usage

The main use of **STOP EXTERNAL ENVIRONMENT JAVA** is to economize on the use of system resources.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Not applicable.

Permissions

None

See also

- *START JAVA Statement* on page 431

TRIGGER EVENT Statement

Triggers a named event. The event may be defined for event triggers or be a scheduled event.

Syntax

TRIGGER EVENT *event-name* [(*parm* = *value*, ...)]

Usage

Actions are tied to particular trigger conditions or schedules by a **CREATE EVENT** statement. You can use **TRIGGER EVENT** to force the event handler to execute, even when the scheduled time or trigger condition has not occurred. **TRIGGER EVENT** does not execute disabled event handlers

When a triggering condition causes an event handler to execute, the database server can provide context information to the event handler using the `event_parameter` function. **TRIGGER EVENT** allows you to explicitly supply these parameters, to simulate a context for the event handler.

When you trigger an event, specify the event name. You can list event names by querying the system table `SYSEVENT`. For example:

```
SELECT event_id, event_name FROM SYS.SYSEVENT
```

Permissions

Requires the MANAGE ANY EVENT system privilege.

See also

- *ALTER EVENT Statement* on page 14
- *CREATE EVENT Statement* on page 119

TRUNCATE Statement

Deletes all rows from a table or materialized view without deleting the table definition.

Syntax

Syntax 1

```
TRUNCATE
    TABLE [ owner.]table-name
    | MATERIALIZED VIEW owner.]materialized-view-name
```

Syntax 2

```
TRUNCATE TABLE  [ owner .]table
 [ PARTITION partition-name
    | SUBPARTITION subpartition-name ]
```

Examples

- **Example 1 –** Delete all rows from the `Sale` table:

```
TRUNCATE TABLE Sale
```

Usage

`TRUNCATE` is equivalent to a `DELETE` statement without a `WHERE` clause, except that each individual row deletion is not entered into the transaction log. After a `TRUNCATE TABLE` statement, the table structure and all of the indexes continue to exist until you issue a `DROP TABLE` statement. The column definitions and constraints remain intact, and permissions remain in effect.

The `TRUNCATE` statement is entered into the transaction log as a single statement, like data definition statements. Each deleted row is not entered into the transaction log.

The `PARTITION` clause specifies which partition to truncate, and does not affect data in other partitions. Use `SUBPARTITION` to truncate tables partitioned by a composite partitioning scheme.

Note: Specifying an RLV-enabled table in the `PARTITION` or `SUBPARTITION` clause results in an error.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

Requires one of:

- TRUNCATE ANY TABLE system privilege.
- ALTER ANY TABLE system privilege.
- ALTER ANY OBJECT system privilege.
- TRUNCATE privilege on the table.
- You own the object.

For both temporary and base tables, you can execute **TRUNCATE TABLE** while other users have read access to the table. This behavior differs from SQL Anywhere, which requires exclusive access to truncate a base table. SAP Sybase IQ table versioning ensures that **TRUNCATE TABLE** can occur while other users have read access; however, the version of the table these users see depends on when the read and write transactions commit.

See also

- *DELETE Statement* on page 241

TRUNCATE TEXT INDEX Statement

Deletes the data in a MANUAL or an AUTO REFRESH text index.

Syntax

```
TRUNCATE TEXT INDEX text-index-name
    ON [ owner.]table-name
```

Parameters

- **ON clause –** the name of the table on which the text index is built.

Examples

- **Example –** The first statement creates the txt_index_manual text index. The second statement populates the text index with data. The third statement truncates the text index data.

```
CREATE TEXT INDEX txt_index_manual ON GROUPO.MarketingInformation
( Description )
    MANUAL REFRESH;
REFRESH TEXT INDEX txt_index_manual ON
GROUPO.MarketingInformation;
TRUNCATE TEXT INDEX txt_index_manual ON
GROUPO.MarketingInformation;
```

  The truncated text index is repopulated with data the next time it is refreshed.

Usage

Use the TRUNCATE TEXT INDEX statement when you want to delete data from a manual text index without dropping the text index definition. For example, to alter the text configuration object for the text index to change the stoplist, truncate the text index, change the text configuration object it refers to, and then refresh the text index to populate it with new data.

You cannot perform a TRUNCATE TEXT INDEX statement on a text index defined as IMMEDIATE REFRESH (the default). For IMMEDIATE REFRESH text indexes, you must drop the index instead.

The TRUNCATE TEXT INDEX requires exclusive access to the table. Any open cursors that reference the table being truncated must be closed, and a COMMIT or ROLLBACK statement must be executed to release the reference to the table.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- ALTER ANY INDEX system privilege.
- ALTER ANY OBJECT system privilege.
- REFERENCES privilege on the table.
- You own the table.

UNION Operation

Combines the results of two or more select statements.

Syntax

```
select-without-order-by
… UNION [ ALL ] select-without-order-by
… [ UNION [ ALL ] select-without-order-by ]…
… [ ORDER BY integer [ ASC | DESC ] [, …] ]
```

Examples

- **Example 1 –** List all distinct surnames of employees and customers:

```
SELECT Surname
FROM Employees
UNION
SELECT Surname
FROM Customers
```

Usage

The results of several **SELECT** statements can be combined into a larger result using **UNION**. The component **SELECT** statements must each have the same number of items in the select list, and cannot contain an **ORDER BY** clause. See *FROM Clause*.

The results of **UNION ALL** are the combined results of the component **SELECT** statements. The results of **UNION** are the same as **UNION ALL**, except that duplicate rows are eliminated. Eliminating duplicates requires extra processing, so **UNION ALL** should be used instead of **UNION** where possible.

If corresponding items in two select lists have different data types, SAP Sybase IQ chooses a data type for the corresponding column in the result, and automatically converts the columns in each component **SELECT** statement appropriately.

If **ORDER BY** is used, only integers are allowed in the order by list. These integers specify the position of the columns to be sorted.

The column names displayed are the same column names that display for the first **SELECT** statement.

Note: When **SELECT** statements include constant values and UNION ALL views but omit the **FROM** clause, use `iq_dummy` to avoid errors. See *FROM Clause* for details.

Standards

- SQL—ISO/ANSI SQL compliant.
- Sybase—Supported by Adaptive Server Enterprise, which also supports a **COMPUTE** clause.

Permissions

Requires SELECT privilege for each component of the **SELECT** statements.

See also

- *FROM Clause* on page 288
- *SELECT Statement* on page 407

UPDATE Statement

Modifies existing rows of a single table, or a view that contains only one table.

Syntax

```
UPDATE table
... SET [column-name  = expression, …
... [ FROM table-expression, ]
```

```
... [ WHERE search-condition ]
... [ ORDER BY expression [ ASC | DESC ] , …]

FROM table-expression
```

Parameters

- **table-expression –** *table-spec* | *table-expression join-type table-spec* [**ON** *condition*] | *table-expression*, …

Examples

- **Example 1 –** Transfer employee Philip Chin (employee 129) from the sales department to the marketing department:

```
UPDATE Employees
SET DepartmentID = 400
WHERE EmployeeID = 129;
```

- **Example 2 –** The Marketing Department (400) increases bonuses from 4% to 6% of each employee's base salary:

```
UPDATE Employees
SET bonus = base * 6/100
WHERE DepartmentID =400;
```

- **Example 3 –** Each employee gets a pay increase with the department bonus:

```
UPDATE Employees
SET emp.Salary = emp.Salary + dept.bonus
FROM Employees emp, Departments dept
WHERE emp.DepartmentID = dept.DepartmentID;
```

- **Example 4 –** Another way to give each employee a pay increase with the department bonus:

```
UPDATE Employees
SET emp.salary = emp.salary + dept.bonus
FROM Employees emp JOIN Departments dept
ON emp.DepartmentID = dept.DepartmentID;
```

Usage

The table on which you use **UPDATE** may be a base table or a temporary table.

Defaults on updates are honored for current user, user and current timestamp, and timestamp only.

Each named column is set to the value of the expression on the right-hand side of the equal sign. Even *column-name* can be used in the expression—the old value is used.

The **FROM** clause can contain multiple tables with join conditions and returns all the columns from all the tables specified and filtered by the join condition and/or **WHERE** condition.

Using the wrong join condition in a **FROM** clause causes unpredictable results. If the **FROM** clause specifies a one-to-many join and the SET clause references a cell from the "many" side

of the join, the cell is updated from the first value selected. In other words, if the join condition causes multiple rows of the table to be updated per row ID, the first row returned becomes the update result. For example:

```
UPDATE T1
SET T1.c2 = T2.c2
FROM T1 JOIN TO T2
ON T1.c1 = T2.c1
```

If table `T2` has more than one row per `T2.c1`, results might be as follows:

T2.c1	T2.c2	T2.c3
1	4	3
1	8	1
1	6	4
1	5	2

With no **ORDER BY** clause, `T1.c2` may be 4, 6, 8, or 9.

- With `ORDER BY T2.c3`, `T1.c2` is updated to 8.
- With `ORDER BY T2.c3 DESC`, `T1.c2` is updated to 6.

SAP Sybase IQ rejects any **UPDATE** statement in which the table being updated is on the null-supplying side of an outer join. In other words:

- In a left outer join, the table on the left side of the join cannot be missing any rows on joined columns.
- In a right outer join, the table on the right side of the join cannot be missing any rows on joined columns.
- In a full outer join, neither table can be missing any rows on joined columns.

For example, in this statement, table `T1` is on the left side of a left outer join, and thus cannot contain be missing any rows:

```
UPDATE T1
SET T1.c2 = T2.c4
FROM T1 LEFT OUTER JOIN T2
ON T1.rowid = T2.rowid
```

Normally, the order in which rows are updated does not matter. However, in conjunction with the **NUMBER(*)** function, an ordering can be useful to get increasing numbers added to the rows in some specified order. If you are not using the **NUMBER(*)** function, avoid using the **ORDER BY** clause, because the **UPDATE** statement performs better without it.

In an **UPDATE** statement, if the **NUMBER(*)** function is used in the **SET** clause and the **FROM** clause specifies a one-to-many join, **NUMBER(*)** generates unique numbers that increase, but do not increment sequentially due to row elimination.

You can use the **ORDER BY** clause to control the result from an **UPDATE** when the **FROM** clause contains multiple joined tables.

SAP Sybase IQ ignores the **ORDER BY** clause in searched **UPDATE** and returns a message that the syntax is not valid ANSI syntax.

If no **WHERE** clause is specified, every row is updated. If you specify a **WHERE** clause, SAP Sybase IQ updates only rows satisfying the search condition.

The left side of each **SET** clause must be a column in a base table.

Views can be updated provided the **SELECT** statement defining the view does not contain a **GROUP BY** clause or an aggregate function, or involve a **UNION** operation. The view should contain only one table.

Character strings inserted into tables are always stored in the case they are entered, regardless of whether the database is case-sensitive or not. Thus a character data type column updated with the string 'Value' is always held in the database with an uppercase V and the remainder of the letters lowercase. **SELECT** statements return the string as 'Value.' If the database is not case-sensitive, however, all comparisons make 'Value' the same as 'value,' 'VALUE,' and so on. The IQ server may return results in any combination of lowercase and uppercase, so you cannot expect case-sensitive results in a database that is case-insensitive (**CASE IGNORE**). Further, if a single-column primary key already contains an entry 'Value,' an **INSERT** of 'value' is rejected, as it would make the primary key not unique.

If the update violates any check constraints, the whole statement is rolled back.

SAP Sybase IQ supports scalar subqueries within the **SET** clause, for example:

```
UPDATE r
SET r.o= (SELECT MAX(t.o)
FROM t ... WHERE t.y = r.y),
r.s= (SELECT SUM(x.s)
FROM x ...
WHERE x.x = r.x)
WHERE r.a = 10
```

SAP Sybase IQ supports DEFAULT column values in **UPDATE** statements. If a column has a DEFAULT value, this DEFAULT value is used as the value of the column in any **UPDATE** statement that does not explicitly modify the value for the column.

See *CREATE TABLE Statement* for details about updating IDENTITY/AUTOINCREMENT columns, which are another type of DEFAULT column.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—With these exceptions, syntax of the IQ **UPDATE** statement is generally compatible with the Adaptive Server Enterprise **UPDATE** statement Syntax 1: SAP Sybase IQ supports multiple tables with join conditions in the **FROM** clause.

  Updates of remote tables are limited to SAP Sybase IQ syntax supported by CIS.

Permissions

Requires UPDATE privilege on the columns being modified.

See also

- *CREATE TABLE Statement* on page 197

UPDATE (positioned) Statement [ESQL] [SP]

Modifies the data at the current location of a cursor.

Syntax

```
UPDATE table-list
SET set-item, …
WHERE CURRENT OF cursor-name
```

Parameters

- **cursor-name –** identifier | hostvar
- **set-item –** *column-name* [.*field-name*…] = *scalar-value*

Examples

- **Example 1 –** An **UPDATE** statement using **WHERE CURRENT OF** cursor:

```
UPDATE Employees SET surname = 'Jones'
WHERE CURRENT OF emp_cursor
```

Usage

This form of the **UPDATE** statement updates the current row of the specified cursor. The current row is defined to be the last row successfully fetched from the cursor, and the last operation on the cursor cannot have been a positioned **DELETE** statement.

SET—The columns that are referenced in *set-item* must be in the base table that is updated. They cannot refer to aliases, nor to columns from other tables or views. If the table you are updating is given a correlation name in the cursor specification, you must use the correlation name in the **SET** clause. The expression on the right side of the **SET** clause may reference columns, constants, variables, and expressions from the **SELECT** clause of the query. The *set-item* expression cannot contain functions or expressions.

The requested columns are set to the specified values for the row at the current row of the specified query. The columns must be in the select list of the specified open cursor.

Changes effected by positioned **UPDATE** statements are visible in the cursor result set, except where client-side caching prevents seeing these changes. Rows that are updated so that they no longer meet the requirements of the **WHERE** clause of the open cursor are still visible.

SAP Sybase does not recommend the use of **ORDER BY** in the **WHERE CURRENT OF** clause. The **ORDER BY** columns may be updated, but the result set does not reorder. The results appear to fetch out of order and appear to be incorrect.

Since SAP Sybase IQ does not support the **CREATE VIEW... WITH CHECK OPTION**, positioned **UPDATE** does not support this option. The **WITH CHECK OPTION** does not allow an update that creates a row that is not visible by the view.

A rowid column cannot be updated by a positioned **UPDATE**.

SAP Sybase IQ supports repeatedly updating the same row in the result set.

Standards

- `The range of cursors that can be updated may contain vendor extensions to ISO/ANSI SQL grammar if the ANSI_UPDATE_CONSTRAINTS option is set to OFF.`
- Embedded SQL use is supported by Open Client/Open Server, and procedure and trigger use is supported in SQL Anywhere.

Permissions

Must have UPDATE permission on the columns being modified.

See also

- *DECLARE CURSOR Statement [ESQL] [SP]* on page 233
- *DELETE Statement* on page 241
- *DELETE (positioned) Statement [ESQL] [SP]* on page 243
- *UPDATE Statement* on page 438

VALIDATE Statement

Validates the current database, or a single table, materialized view, or index in the IQ catalog (system) store.

Syntax

Syntax 1 – Validating a database

```
VALIDATE { CHECKSUM | DATABASE }
```

Syntax 2 – Validating tables and materialized views

```
VALIDATE {
TABLE [ owner.]table-name
| MATERIALIZED VIEW [ owner.]materialized-view-name }
[ WITH EXPRESS CHECK ]
```

Syntax 3 – Validating indexes

```
VALIDATE {
INDEX index-name
| [ INDEX ] FOREIGN KEY role-name
| [ INDEX ] PRIMARY KEY  }
ON [ owner.]object-name

object-name:
table-name
| materialized-view-name
```

Syntax 4 – Validating text indexes

```
VALIDATE TEXT INDEX index-name
ON [ owner.]table-name
```

Usage

Use the **VALIDATE CHECKSUM** statement to validate the checksum on each page of a database. The **VALIDATE CHECKSUM** statement ensures that database pages have not been modified on disk. When a database is created with checksums enabled, a checksum is calculated for each database page before it is written to disk. **VALIDATE CHECKSUM** reads each database page directly from disk—not via the database server's cache—and calculates the checksum for each page. If the calculated checksum for a page does not match the stored checksum for that page, an error occurs and information about the invalid page appears in the database server messages window. The **VALIDATE CHECKSUM** statement is not recommended for databases that have checksums disabled because it reads the entire database from disk.

Use the **VALIDATE DATABASE** statement to ensure that the free map correctly identifies pages as either allocated or free and that no BLOBs have been orphaned. **VALIDATE DATABASE** also performs checksum validation and verifies that each database page belongs to the correct object. For example, on a table page, the table ID must identify a valid table whose definition must include the current page in its set of table pages. The **VALIDATE DATABASE** statement brings pages into the database server's cache in sequential order. This results in their validation, as the database server always verifies the contents and checksums of pages brought into the cache. If you start database validation while the database cleaner is running, the validation does not run until the database cleaner is finished running.

The **VALIDATE TABLE** statement validates the specified table and all of its indexes by checking that the set of all rows and values in the base table matches the set of rows and values contained in each index. **VALIDATE TABLE** also traverses all the table's BLOBs, verifies BLOB allocation maps, and detects orphaned BLOBs. The **VALIDATE TABLE** statement checks the physical structure of the table's index pages and verifies the order of the index hash values, and the index's uniqueness requirements (if any are specified). For foreign key indexes, unless the WITH EXPRESS CHECK clause is specified, each value is looked up in the primary key table to verify that referential integrity is intact. Because the **VALIDATE TABLE** statement, like **VALIDATE DATABASE**, uses the database server's cache, the database server also verifies the checksums and basic validity of all pages in use by a table and its indexes.

The **VALIDATE INDEX** statement performs the same operations as the **VALIDATE TABLE** statement except that it only validates the specified index and its underlying table; other indexes are not checked. For foreign key indexes, unless the WITH EXPRESS CHECK clause is specified, each value is looked up in the primary key table to verify that referential integrity is intact. Specifying the WITH EXPRESS CHECK clause disables referential integrity checking and can therefore significantly improve performance. If the specified index is not a foreign key index, WITH EXPRESS CHECK has no effect.

Use the **VALIDATE TEXT INDEX** statement to verify that the positional information for the terms in the index is intact. If the positional information is not intact, an error is generated and you must rebuild the text index. If the text index is either auto or manual, you can rebuild the text index by executing the **REFRESH TEXT INDEX** statement. If the generated error concerns an immediate text index, you must drop the immediate index and create a new one.

Warning! Validating a table or an entire database should be performed while no connections are making changes to the database; otherwise, errors may be reported indicating some form of database corruption even though no corruption actually exists.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires one of:

- VALIDATE ANY OBJECT system privilege.

VALIDATE LDAP SERVER Statement

Validates changes to the settings of existing LDAP server configuration objects before applying them.

This statement is useful for an administrator when setting up a new server to use LDAP user authentication, and for diagnosing problems between the LDAP server configuration object and the external LDAP server. Any connection made by the **VALIDATE LDAP SERVER** statement is temporary and is closed by the end of the statement.

Syntax

```
VALIDATE LDAP SERVER [ ldapua-server-name | ldapua-server-attribs ]
[ CHECK userid [ user-dn-string ] ]

ldapua-server-attribs:
SEARCH DN
            URL { 'URL_string' | NULL }
            | ACCESS ACCOUNT { 'DN_string' | NULL }
            | IDENTIFIED BY ( 'password' | NULL }
            | IDENTIFIED BY ENCRYPTED { encrypted-password | NULL }
```

```
| AUTHENTICATION URL { 'URL_string' | NULL }
| CONNECTION TIMEOUT timeout_value
| CONNECTION RETRIES retry_value
| TLS { ON | OFF }
```

Parameters

- **ldapua-server-name –** identifies the LDAP server configuration object.
- **URL –** identifies the host (by name or by IP address), port number, and the search to be performed for the DN lookup for a given user ID. This value is validated for correct LDAP URL syntax before it is stored in the `ISYSLDAPSERVER` system table. The maximum size for this string is 1024 bytes.
- **ACCESS ACCOUNT –** a user created on the LDAP server for use by SAP Sybase IQ, not a user within SAP Sybase IQ. The distinguished name (DN) for this user is used to connect to the LDAP server. This user has permissions within the LDAP server to search for DNs by user ID in the locations specified by the SEARCH DN URL. The maximum size for this string is 1024 bytes.
- **IDENTIFIED BY –** provides the password associated with the ACCESS ACCOUNT user. The password is stored using symmetric encryption on disk. Use the value NULL to clear the password and set it to none. The maximum size of a clear text password is 255 bytes.
- **IDENTIFIED BY ENCRYPTED –** configures the password associated with the ACCESS ACCOUNT distinguished name in an encrypted format. The binary value is the encrypted password and is stored on disk as is. Use the value NULL to clear the password and set it to none. The maximum size of the binary is 289 bytes
- **AUTHENTICATION URL –** identifies the host (by name or IP address) and the port number of the LDAP server to use for authentication of the user. This is the value defined for <URL_string> and is validated for correct LDAP URL syntax before it is stored in `ISYSLDAPSERVER` system table. The DN of the user obtained from a prior DN search and the user password bind a new connection to the authentication URL. A successful connection to the LDAP server is considered proof of the identity of the connecting user. The maximum size for this string is 1024 bytes.
- **CONNECTION TIMEOUT –** specifies the connection timeout from SAP Sybase IQ to the LDAP server for both DN searches and authentication. This value is in milliseconds, with a default value of 10 seconds.
- **CONNECTION RETRIES –** specifies the number of retries on connections from SAP Sybase IQ to the LDAP server for both DN searches and authentication. The valid range of values is 1 – 60, with a default value of 3.
- **TLS –** defines whether the TLS or Secure LDAP protocol is used for connections to the LDAP server for both DN searches and authentication. When set to ON, the TLS protocol is used and the URL begins with "ldap://" When set to OFF (or not specified), Secure LDAP protocol is used and the URL begins with “ldaps://”. When using the TLS protocol, specify the database security option TRUSTED_CERTIFICATES_FILE with a file name

containing the certificate of the Certificate Authority (CA) that signed the certificate used by the LDAP server.

- **CHECK *userID* –** the userID whose existence is validated on the LDAP server.
- **user-dn-string –** compares a user's DN value with the user ID for verification purposes.

Examples

- **Example 1 –** assume the apps_primary LDAP server configuration object was created as follows:

```
SET OPTION PUBLIC.login_mode = 'Standard,LDAPUA'
CREATE LDAP SERVER apps_primary
SEARCH DN
    URL 'ldap://my_LDAPserver:389/dc=MyCompany,dc=com??sub?cn=*'
    ACCESS ACCOUNT 'cn=aseadmin, cn=Users, dc=mycompany, dc=com'
    IDENTIFIED BY 'Secret99Password'
AUTHENTICATION URL 'ldap://my_LDAPserver:389/'
CONNECTION TIMEOUT 3000
WITH ACTIVATE
```

  This statement validates the existence of a userID `myusername` by using the optional CHECK clause to compare the userID to the expected user distinguished name (enclosed in quotation marks) on the `apps_primary` LDAP server configuration object.

```
VALIDATE LDAP SERVER apps_primary
CHECK myusername 'cn=myusername,cn=Users,dc=mycompany,dc=com'
```

- **Example 2 –** the name of the LDAP server configuration object does not have to defined in the **VALIDATE LDAP SERVER** statement if you include the search attributes:

```
VALIDATE LDAP SERVER
SEARCH DN
   URL  'ldap://my_LDAPserver:389/dc=MyCompany,dc=com??sub?cn=*'
    ACCESS ACCOUNT 'cn=aseadmin, cn=Users, dc=mycompany, dc=com'
    IDENTIFIED BY 'Secret99Password'
AUTHENTICATION URL 'ldap://my_LDAPserver:389/'
CONNECTION TIMEOUT 3000
CHECK myusername 'cn=myusername,cn=Users,dc=mycompany,dc=com'
```

Usage

When validating the LDAP server configuration object by name, definitions from prior **CREATE LDAP SERVER** and **ALTER LDAP SERVER** statements are used. Alternately, when *ldapua-server-attributes* are specified instead of the LDAP server configuration object name, the specified attributes are validated. When *ldapua-server-attributes* are specified, the URLs are parsed to identify syntax errors, and statement processing stops is a syntax error is detected,

Whether using an LDAP server configuration object name or a successfully parsed set of *ldapua-server-attributes*, a connection to the external LDAP server is attempted. If the

parameter ACCESS ACCOUNT and a password are specified, the values are used to establish the connection to the SEARCH DN URL. This the SEARCH DN URL, ACCESS ACCOUNT, and ACCESS ACCOUNT password.

When using the optional CHECK clause, the userID is used in the search to validate the existence of the user on the external LDAP server. When the expected DN value for a given user is known, the value can be specified, and is compared with the result of the search to determine success or failure.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Requires the MANAGE ANY LDAP SERVER system privilege.

WAITFOR Statement

Delays processing for the current connection for a specified amount of time or until a given time.

Syntax

```
WAITFOR {
DELAY time | TIME time }
[ CHECK EVERY integer ]
[ AFTER MESSAGE BREAK ]
```

Parameters

- **time –** string

Examples

- **Example 1 –** Wait for three seconds:

  ```
  WAITFOR DELAY '00:00:03'
  ```

- **Example 2 –** Wait for 0.5 seconds (500 milliseconds):

  ```
  WAITFOR DELAY '00:00:00:500'
  ```

- **Example 3 –** Wait until 8 p.m.:

  ```
  WAITFOR TIME '20:00'
  ```

Usage

The **WAITFOR** statement wakes up periodically (every 5 seconds by default) to check if it has been canceled or if messages have been received. If neither of these has happened, the statement continues to wait.

If **DELAY** is used, processing is suspended for the given interval. If **TIME** is specified, processing is suspended until the server time reaches the time specified.

If the current server time is greater than the time specified, processing is suspended until that time on the following day.

WAITFOR provides an alternative to the following statement, and might be useful for customers who choose not to enable Java in the database:

```
call java.lang.Thread.sleep( <time_to_wait_in_millisecs> )
```

In many cases, scheduled events are a better choice than using **WAITFOR TIME**, because scheduled events execute on their own connection.

CHECK EVERY clause—This optional clause controls how often the **WAITFOR** statement wakes up. By default, **WAITFOR** wakes up every 5 seconds. The value is in milliseconds, and the minimum value is 250milliseconds.

AFTER MESSAGE BREAK clause—The **WAITFOR** statement can be used to wait for a message from another connection. In most cases, when a message is received it is forwarded to the application that executed the **WAITFOR** statement and the **WAITFOR** statement continues to wait. If the **AFTER MESSAGE BREAK** clause is specified, when a message is received from another connection, the **WAITFOR** statement completes. The message text is not forwarded to the application, but it can be accessed by obtaining the value of the MessageReceived connection property.

Side Effects

- The implementation of this statement uses a worker thread while it is waiting. This uses up one of the threads specified by the **-gn** server command line option.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—This statement is also implemented by Adaptive Server Enterprise.

Permissions

None

See also

- *CREATE EVENT Statement* on page 119

WHENEVER Statement [ESQL]

Specifies error handling in an Embedded SQL program.

Syntax

```
WHENEVER
{ SQLERROR | SQLWARNING | NOTFOUND }
… { GOTO label | STOP | CONTINUE | C code; }
```

Parameters

- **label –** identifier

Examples

- **Example 1 –**

```
EXEC SQL WHENEVER NOTFOUND GOTO done;
```

- **Example 2 –**

```
EXEC SQL WHENEVER SQLERROR
    {
        PrintError( &sqlca );
        return( FALSE );
    };
```

Usage

WHENEVER can be put anywhere in an Embedded SQL C program, and does not generate any code. The preprocessor generates code following each successive SQL statement. The error action remains in effect for all Embedded SQL statements from the source line of the **WHENEVER** statement until the next **WHENEVER** statement with the same error condition, or the end of the source file.

The default action is **CONTINUE**.

WHENEVER is provided for convenience in simple programs. Most of the time, checking the `sqlcode` field of the SQLCA (SQLCODE) directly is the easiest way to check error conditions. In this case, **WHENEVER** is not used. The **WHENEVER** statement causes the preprocessor to generate an *if (SQLCODE)* test after each statement.

Note: The error conditions are in effect based on positioning in the C language source file and not on when the statements are executed.

Standards

- SQL—Vendor extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Open Client/Open Server.

Permissions

None

WHILE Statement [T-SQL]

Provides repeated execution of a statement or compound statement.

Syntax

```
WHILE expression
... statement
```

Examples

- **Example 1 –**

```
WHILE (SELECT AVG(unit_price) FROM Products) < 30
BEGIN
    DELETE FROM Products
    WHERE UnitPrice = MAX(UnitPrice)
    IF ( SELECT MAX(UnitPrice) FROM Products ) < 50
        BREAK
END
```

The **BREAK** statement breaks the **WHILE** loop, if the most expensive product has a price less than $50. Otherwise, the loop continues until the average price is greater than $30.

Usage

The **WHILE** conditional affects the performance of only a single SQL statement, unless statements are grouped into a compound statement between the keywords **BEGIN** and **END**.

The **BREAK** statement and **CONTINUE** statement can be used to control execution of the statements in the compound statement. The **BREAK** statement terminates the loop, and execution resumes after the **END** keyword, marking the end of the loop. The **CONTINUE** statement causes the **WHILE** loop to restart, skipping any statements after the **CONTINUE**.

Standards

- SQL—Transact-SQL extension to ISO/ANSI SQL grammar.
- Sybase—Supported by Adaptive Server Enterprise.

Permissions

None

See also

- *BEGIN … END Statement* on page 81

Database Options

Database options and Interactive SQL options customize and modify database behavior. SAP Sybase IQ database options are divided into three classes: general, Transact-SQL compatibility, and Interactive SQL.

Introduction to Database Options

Database options control many aspects of database behavior including compatibility, error handling, and concurrency.

For example, you can use database options for the purposes such as:

- Compatibility – lets you control how much like Adaptive Server Enterprise your SAP Sybase IQ database operates, and whether SQL that does not conform to SQL92 generates errors.
- Error handling – lets you control what happens when errors, such as dividing by zero or overflow errors, occur.
- Concurrency and transactions – lets you control the degree of concurrency and details of COMMIT behavior using options.

You set options with the **SET OPTION** statement, which has this general syntax:

```
SET [ EXISTING ] [ TEMPORARY ] OPTION
... [ userid. | PUBLIC. ]option-name = [ option-value ]
```

Specify a user ID or role name to set the option only for that user or role. Every user belongs to the `PUBLIC` role. If no user ID or role is specified, the option change is applied to the currently logged on user ID that issued the **SET OPTION** statement.

For example, this statement applies a change to the `PUBLIC` user ID, a role to which all users belong:

```
SET OPTION Public.login_mode = standard
```

Note: When you set an option to `TEMPORARY` without specifying a user or role, the new option value takes effect only for the currently logged on user ID that issued the statement, and only for the duration of the connection. When you set an option to `TEMPORARY` for the `PUBLIC` role, the change remains in place for as long as the database is running—when the database shuts down, `TEMPORARY` options for the `PUBLIC` role revert back to their permanent value.

When you set an option without issuing the **TEMPORARY** keyword, the new option value is permanent for the user or role who issued the statement.

See *Scope and Duration of Database Options*, *Temporary Options*, and *SET OPTION Statement* for more information on temporary versus permanent option values.

The maximum length of *option-value*, when set to a string, is 127 bytes.

Note: For all database options that accept integer values, SAP Sybase IQ truncates any decimal *option-value* setting to an integer value. For example, the value 3.8 is truncated to 3.

Warning! Do not change option settings while fetching rows.

See also

- *Scope and Duration of Database Options* on page 455
- *Temporary Options* on page 456
- *SET OPTION Statement* on page 422

Current Option Settings

You can obtain a list of option settings, or the values of individual options, using **sp_iqcheckoptions**, **sa_conn_properties**, the **SET** statement, Sybase Control Center, and the `SYSOPTIONS` system view.

- For the connected user, the **sp_iqcheckoptions** stored procedure displays a list of the current value and the default value of database options that have been changed from the default. **sp_iqcheckoptions** considers all SAP Sybase IQ and SQL Anywhere database options. SAP Sybase IQ modifies some SQL Anywhere option defaults, and these modified values become the new default values. Unless the new SAP Sybase IQ default value is changed again, **sp_iqcheckoptions** does not list the option.

  sp_iqcheckoptions also lists server start-up options that have been changed from the default values.

  When a DBA runs **sp_iqcheckoptions**, he or she sees all options set on a permanent basis for all roles and users and sees temporary options set for DBA. Users who are not DBAs see their own temporary options. All users see nondefault server start-up options.

  The **sp_iqcheckoptions** stored procedure requires no parameters. In Interactive SQL, run:

  ```
  sp_iqcheckoptions
  ```

  The system table `DBA.SYSOPTIONDEFAULTS` contains all of the names and default values of the SAP Sybase IQ and SQL Anywhere options. You can query this table to see all option default values.
- Current option settings for your connection are available as a subset of connection properties. You can list all connection properties using the **sa_conn_properties** system procedure:

  ```
  call sa_conn_properties
  ```
- In Interactive SQL, the **SET** statement with no arguments lists the current setting of options:

  ```
  SET
  ```

- In Sybase Control Center, right-click a database and select Options from the submenu.
- Query the SYSOPTIONS system view:

```
SELECT *
FROM SYSOPTIONS
```

  This shows all PUBLIC values, and those USER values that have been explicitly set.
- Use the **connection_property** system function to obtain an individual option setting. For example, this statement returns the value of the Ansinull option:

```
SELECT connection_property ('Ansinull')
```

Scope and Duration of Database Options

You can set options at three levels of scope: public, user, and temporary.

Temporary options take precedence over user and public settings. User-level options take precedence over public settings. If you set a user-level option for the current user, the corresponding temporary option is set as well.

Some options, such as COMMIT behavior, are database-wide in scope. Setting these options requires DBA permissions. Other options, such as ISOLATION_LEVEL, can also be applied to only the current connection, and need no special permissions.

Changes to option settings take place at different times, depending on the option. Changing a global option such as RECOVERY_TIME takes place the next time the server is started. Some of the options that take effect after the server is restarted:

Database Options that Require Restarting the Server
CACHE_PARTITIONS
CHECKPOINT_TIME
OS_FILE_CACHE_BUFFERING
OS_FILE_CACHE_BUFFERING_TEMPDB
PREFETCH_BUFFER_LIMIT
PREFETCH_BUFFER_PERCENT
RECOVERY_TIME
SWEEPER_THREADS_PERCENT
WASH_AREA_BUFFERS_PERCENT

Options that affect only the current connection generally take place immediately. For example, you can change option settings in the middle of a transaction.

Warning! Changing options when a cursor is open can lead to unreliable results. For example, changing DATE_FORMAT might not change the format for the next row when a cursor is

opened. Depending on the way the cursor is being retrieved, it might take several rows before the change works its way to the user.

Temporary Options

Adding the **TEMPORARY** keyword to the `SET OPTION` statement changes the duration of the change.

Ordinarily an option change is permanent: it will not change until it is explicitly changed using the **SET OPTION** statement.

When the **SET TEMPORARY OPTION** statement is executed, the new option value takes effect only for the current connection, and only for the duration of the connection.

When the **SET TEMPORARY OPTION** is used to set a `PUBLIC` option, the change is in place for as long as the database is running. When the database is shut down, `TEMPORARY` options for the `PUBLIC` user ID revert back to their permanent value.

Setting an option for the `PUBLIC` user ID temporarily offers a security advantage. For example, when the `LOGIN_MODE` option is enabled, the database relies on the login security of the system on which it is running. Enabling `LOGIN_MODE` temporarily means that a database relying on the security of a Windows domain will not be compromised if the database is shut down and copied to a local machine. In this case, the `LOGIN_MODE` option reverts to its permanent value, which could be Standard, a mode where integrated logins are not permitted.

PUBLIC Options

`PUBLIC` options can be set for a user, user extended role, or the PUBLIC role. They can be set for self or for another user or role.

Setting a `PUBLIC` option for the PUBLIC role sets the value for all users who do not already have the `PUBLIC` option set at the user level. Setting a `PUBLIC` option for a user or user-extended role overrides any value defined at the PUBLIC role level.

No system privilege is required to set a `PUBLIC` option for self, but does require the SET ANY PUBLIC OPTION system privilege to set for another user, user-extended role, or PUBLIC role. `PUBLIC` options cannot be set for user-defined roles. `PUBLIC` database options take effect immediately. No shut down and restart of the database server is required for the change to take effect.

SECURITY Options

SECURITY options are special category which are relevant to security of the database. It can be set at user level or PUBLIC level depending on options.

Changes to SECURITY database options take effect immediately. Requires the SET ANY SECURITY OPTION system privilege to set SECURITY database options.

No shut down and restart of the database server is required for the change to take effect.

SYSTEM Options

SYSTEM options are special category which are relevant to security of the database. It can be set at user level or PUBLIC level.

Requires the SET ANY SYSTEM OPTION system privilege to set SYSTEM options. Takes effect immediately.

Delete an Option Setting

Omit the *option-value* to delete the option setting from the database.

If *option-value* is omitted, the specified option setting is deleted from the database. If *option-value* is a personal option setting, the value reverts back to the `PUBLIC` setting. If a `TEMPORARY` option is deleted, the option setting reverts back to the permanent setting.

For example, reset the `ANSINULL` option to its default value:

```
SET OPTION ANSINULL =
```

If you incorrectly type the name of an option when you are setting the option, the incorrect name is saved in the `SYSOPTION` table. You can remove the incorrectly typed name from the `SYSOPTION` table by setting the option `PUBLIC` with an equality after the option name and no value:

```
SET OPTION PUBLIC.a_mistyped_name=;
```

For example, if you set an option and incorrectly type the name, you can verify that the option was saved by selecting from the `SYSOPTIONS` view:

```
SET OPTION PUBLIC.a_mistyped_name='ON';
SELECT * FROM SYSOPTIONS ORDER BY 2;
```

user_name	option	setting
PUBLIC	a_mistyped_name	ON
PUBLIC	Abort_On_Error_File	
PUBLIC	Abort_On_Error_Line	0
PUBLIC	Abort_On_Error_Number	0
...		

Remove the incorrectly typed option by setting the option to no value, then verify that the option is removed:

```
SET OPTION PUBLIC.a_mistyped_name=;
SELECT * FROM SYSOPTIONS ORDER BY 2;
```

user_name	option	setting
PUBLIC	Abort_On_Error_File	
PUBLIC	Abort_On_Error_Line	0
PUBLIC	Abort_On_Error_Number	0
...		

If you remove the PUBLIC option and then try to add the USER option, an error message displays:

```
Couldn't execute the statement.
Invalid option 'chained' -- no PUBLIC setting exists
SQLCODE=-200?ODBC 3 State="42000"
Line 1,Column 29
```

In order to reset the PUBLIC option to the default value, explicitly set the default value:

```
SET OPTION PUBLIC.chained ='ON';
```

Initial Option Settings

You can use stored procedures to configure the initial database option settings of a user.

Connections to SAP Sybase IQ can be made through the TDS (tabular data stream) protocol (Open Client and jConnect™ for JDBC™ connections) or through the SAP Sybase IQ protocol (ODBC, Embedded SQL).

If users have both TDS and the SAP Sybase IQ-specific protocol, you can configure their initial settings using stored procedures. As it is shipped, SAP Sybase IQ uses this method to set Open Client connections and jConnect connections to reflect default Adaptive Server Enterprise behavior.

The initial settings are controlled using the LOGIN_PROCEDURE option, which is called after all the checks have been performed to verify that the connection is valid. The LOGIN_PROCEDURE option names a stored procedure to run when users connect. The default setting is to use the **sp_login_environment** system stored procedure. You can specify a different stored procedure.

The **sp_login_environment** procedure checks to see if the connection is being made over TDS. If it is, it calls the **sp_tsql_environment** procedure, which sets several options to new default values for the current connection.

See also

- *LOGIN_PROCEDURE Option* on page 560

Deprecated Database Options

See New Features Summary SAP Sybase IQ 16.0 for information about database options deprecated in this release.

General Database Options

General database options is the class of options consisting of all options except Transact-SQL compatibility options and Interactive SQL options.

See also

- *Transact-SQL Compatibility Options* on page 464
- *Interactive SQL Options* on page 466
- *AFFINITY_AUTOEXCLUDE_TIMEOUT Option* on page 467
- *AGGREGATION_PREFERENCE Option* on page 468
- *ALLOW_SNAPSHOT_VERSIONING Option* on page 470
- *ANSI_UPDATE_CONSTRAINTS Option* on page 474
- *ALLOW_READ_CLIENT_FILE Option* on page 475
- *ASE_BINARY_DISPLAY Option* on page 476
- *ASE_FUNCTION_BEHAVIOR Option* on page 477
- *AUDITING Option [database]* on page 478
- *BASE_TABLES_IN_RLV_STORE Option* on page 478
- *BIT_VECTOR_PINNABLE_CACHE_PERCENT Option* on page 479
- *BLOCKING Option* on page 480
- *BLOCKING_TIMEOUT Option* on page 480
- *BT_PREFETCH_MAX_MISS Option* on page 481
- *BT_PREFETCH_SIZE Option* on page 482
- *BTREE_PAGE_SPLIT_PAD_PERCENT Option* on page 483
- *CACHE_AFFINITY_PERCENT Option* on page 483
- *CACHE_PARTITIONS Option* on page 484
- *CHECKPOINT_TIME Option* on page 486
- *CIS_ROWSET_SIZE Option* on page 486
- *CONVERSION_MODE Option* on page 489
- *CONVERT_VARCHAR_TO_1242 Option* on page 495
- *COOPERATIVE_COMMIT_TIMEOUT Option* on page 496
- *COOPERATIVE_COMMITS Option* on page 497
- *CREATE_HG_WITH_EXACT_DISTINCTS* on page 497
- *CURSOR_WINDOW_ROWS Option* on page 498
- *DATE_FIRST_DAY_OF_WEEK Option* on page 499

Data Extraction Options

The data extraction facility allows you to extract data from a database by redirecting the output of a **SELECT** statement from the standard interface to one or more disk files or named pipes.

The `TEMP_EXTRACT_...` database options are used to control the data extraction feature.

Transact-SQL Compatibility Options

Transact-SQL compatibility options allow SAP Sybase IQ behavior to be compatible with Adaptive Server Enterprise, or to both support old behavior and allow ISO SQL92 behavior.

For further compatibility with Adaptive Server Enterprise, you can set some of these options for the duration of the current connection using the Transact-SQL **SET** statement instead of the SAP Sybase IQ **SET OPTION** statement.

See also

- *ANSINULL Option [TSQL]* on page 472
- *ANSI_SUBSTRING Option [TSQL]* on page 473
- *CHAINED Option [TSQL]* on page 485
- *CLOSE_ON_ENDTRANS Option [TSQL]* on page 487
- *CONTINUE_AFTER_RAISERROR Option [TSQL]* on page 487
- *CONVERSION_ERROR Option [TSQL]* on page 488
- *DIVIDE_BY_ZERO_ERROR Option [TSQL]* on page 515
- *NEAREST_CENTURY Option [TSQL]* on page 580
- *NON_KEYWORDS Option [TSQL]* on page 582
- *ON_ERROR Option [Interactive SQL]* on page 585
- *ON_TSQL_ERROR Option [TSQL]* on page 586
- *QUOTED_IDENTIFIER Option [TSQL]* on page 605
- *SQL_FLAGGER_ERROR_LEVEL Option [TSQL]* on page 618
- *SQL_FLAGGER_WARNING_LEVEL Option [TSQL]* on page 619
- *STRING_RTRUNCATION Option [TSQL]* on page 620
- *TSQL_VARIABLES Option [TSQL]* on page 646

Transact-SQL Option Settings for Adaptive Server Enterprise Compatibility

The default setting for some options differs from the Adaptive Server Enterprise default setting. To ensure compatible behavior, you should explicitly set the options.

When a connection is made using the Open Client or JDBC interfaces, some option settings are explicitly set for the current connection to be compatible with Adaptive Server Enterprise.

Table 17. Transact-SQL Options Set Explicitly for ASE Compatibility

Option	ASE-compatible setting
ALLOW_NULLS_BY_DEFAULT	OFF
ANSINULL	OFF
CHAINED	OFF
CONTINUE_AFTER_RAISERROR	ON
DATE_FORMAT	YYYY-MM-DD
DATE_ORDER	MDY
ESCAPE_CHARACTER	OFF
ISOLATION_LEVEL	1
ON_TSQL_ERROR	CONDITIONAL

Option	ASE-compatible setting
QUOTED_IDENTIFIER	OFF
TIME_FORMAT	HH:NN:SS.SSS
TIMESTAMP_FORMAT	YYYY-MM-DD HH:NN:SS.SSS
TSQL_VARIABLES	OFF

Interactive SQL Options

Interactive SQL options change how Interactive SQL interacts with the database.

Syntax 1

```
SET [ TEMPORARY ] OPTION
... [ userid. | PUBLIC. ]option-name = [ option-value ]
```

Syntax 2

```
SET PERMANENT
```

Syntax 3

```
SET
```

Parameters

```
userid:
identifier, string or host-variable
```

```
option-name:
identifier, string or host-variable
```

```
option-value:
host-variable (indicator allowed), string, identifier,
or number
```

Description

Syntax 1 with the **TEMPORARY** keyword cannot be used between the **BEGIN** and **END** keywords of a compound statement.

Syntax 2 **SET PERMANENT** stores all current Interactive SQL options in the SYSOPTIONS system table. These settings are automatically established every time Interactive SQL is started for the current user ID.

Syntax 3 is used to display all of the current option settings. If there are temporary options set for Interactive SQL or the database server, these are displayed; otherwise, the permanent option settings are displayed.

See also

- *General Database Options* on page 459
- *Transact-SQL Compatibility Options* on page 464
- *Alphabetical List of Options* on page 467
- *DEFAULT_ISQL_ENCODING Option [Interactive SQL]* on page 509
- *ON_ERROR Option [Interactive SQL]* on page 585

Alphabetical List of Options

Descriptions of general, Transact-SQL compatibility, and Interactive SQL database options. Some option names are followed by a class indicator in square brackets.

The database option class indicators are:

- [Interactive SQL] – The option changes how Interactive SQL interacts with the database.
- [TSQL] – The option allows SAP Sybase IQ behavior to be made compatible with Adaptive Server Enterprise, or to both support old behavior and allow ISO SQL92 behavior.

See also

- *Introduction to Database Options* on page 453
- *General Database Options* on page 459
- *Transact-SQL Compatibility Options* on page 464
- *Interactive SQL Options* on page 466

AFFINITY_AUTOEXCLUDE_TIMEOUT Option

The amount of time before SAP Sybase IQ removes a shut down node from the affinity map and reassigns its partitions to other nodes.

Allowed Values
0 to 10080 minutes (1 week)

Default
10 minutes

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
The amount of time before SAP Sybase IQ removes a shut down node from the affinity map and reassigns its partitions to other nodes.

AGGREGATION_PREFERENCE Option

Controls the choice of algorithms for processing an aggregate.

Allowed Values
-6 to 6

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
For aggregation (**GROUP BY**, **DISTINCT**, **SET** functions) within a query, the SAP Sybase IQ optimizer has a choice of several algorithms for processing the aggregate. `AGGREGATION_PREFERENCE` lets you override the costing decision of the optimizer when choosing the algorithm. the option does not override internal rules that determine whether an algorithm is legal within the query engine.

This option is normally used for internal testing and for manually tuning queries that the optimizer does not handle well. Only experienced DBAs should use it. Inform SAP Sybase Technical Support, if you need to set `AGGREGATION_PREFERENCE`, as setting this option might mean that a change to the optimizer may be appropriate.

Value	Action
0	Let the optimizer choose
1	Prefer aggregation with a sort
2	Prefer aggregation using IQ indexes
3	Prefer aggregation with a hash
4	Prefer aggregation with a distinct/grouping sort

Value	Action
5	Prefer aggregation with a sort if grouping columns include all the partitioning keys of a hash partitioned table.
6	Prefer aggregation with a hash if grouping columns include all the partitioning keys of a hash partitioned table.
-1	Avoid aggregation with a sort
-2	Avoid aggregation using IQ indexes
-3	Avoid aggregation with a hash
-4n	Avoid aggregation with a distinct/grouping sort
-5	Avoid aggregation with a sort if grouping columns include all the partitioning keys of a hash partitioned table.
-6	Avoid aggregation with a hash if grouping columns include all the partitioning keys of a hash partitioned table.

ALLOW_NULLS_BY_DEFAULT Option [TSQL]

Controls whether new columns created without specifying either NULL or NOT NULL are allowed to contain NULL values.

Allowed values
ON, OFF

Default
ON

OFF for Open Client and JDBC connections

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The `ALLOW_NULLS_BY_DEFAULT` option is included for Transact-SQL compatibility.

ALLOW_SNAPSHOT_VERSIONING Option

Applies to all base tables in the database (as opposed to RLV-enabled tables only). Restricts table versioning for all base tables to either table-level or row-level snapshot versioning. This option does not apply to the IQ catalog store.

Allowed Values
any, table-level, row-level

Default
any

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description

Value	Action
any	No restrictions on snapshot versioning.
row-level	Allows only row-level snapshot versioning. Any transactions attempting to use table-level versioning to modify a table will fail with an `Illegal snapshot isolation` error.
table-level	Allows only table-level snapshot versioning. Any transactions attempting to use row-level versioning to modify a table will fail with an `Illegal snapshot isolation` error.

ANSI_CLOSE_CURSORS_ON_ROLLBACK Option [TSQL]

Controls whether cursors that were opened **WITH HOLD** are closed when a **ROLLBACK** is performed.

Allowed Values
ON

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The ANSI SQL/3 standard requires all cursors be closed when a transaction is rolled back. This option forces that behavior and cannot be changed. The `CLOSE_ON_ENDTRANS` option overrides this option.

ANSI_PERMISSIONS Option [TSQL]

Controls permissions checking for `DELETE` and `UPDATE` statements.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
With `ANSI_PERMISSIONS` ON, SQL92 permissions requirements for **DELETE** and **UPDATE** statements are checked. The default value is OFF in Adaptive Server Enterprise. This table outlines the differences:

Table 18. Effect of ANSI_PERMISSIONS Option

SQL statement	Permissions required with ANSI_PERMISSIONS OFF	Permissions required with ANSI_PERMISSIONS ON
UPDATE	UPDATE permission on the columns where values are being set	UPDATE permission on the columns where values are being set SELECT permission on all columns appearing in the WHERE clause. SELECT permission on all columns on the right side of the set clause.
DELETE	DELETE permission on table	DELETE permission on table. **SELECT permission on all columns appearing in the WHERE clause.**

ANSINULL Option [TSQL]

Controls the interpretation of using = and != with NULL.

Allowed Values
ON, OFF

Default
ON

OFF for OPen CLient and JDBC connections

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
With `ANSINULL` ON, results of comparisons with NULL using '=' or '!=' are unknown. This includes results of comparisons implied by other operations such as CASE.

Setting `ANSINULL` to OFF allows comparisons with NULL to yield results that are not unknown, for compatibility with Adaptive Server Enterprise.

Note: Unlike SQL Anywhere, SAP Sybase IQ does not generate the warning "`null value eliminated in aggregate function`" (SQLSTATE=01003) for aggregate functions on columns containing NULL values.

ANSI_SUBSTRING Option [TSQL]

Controls the behavior of the SUBSTRING (SUBSTR) function when negative values are provided for the start or length parameters.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When the `ANSI_SUBSTRING` option is set to ON, the behavior of the **SUBSTRING** function corresponds to ANSI/ISO SQL/2003 behavior. A negative or zero start offset is treated as if the string were padded on the left with noncharacters, and gives an error if a negative length is provided.

When this option is set to OFF, the behavior of the **SUBSTRING** function is the same as in earlier versions of SAP Sybase IQ: a negative start offset means an offset from the end of the string, and a negative length means the desired substring ends length characters to the left of the starting offset. Using a start offset of 0 is equivalent to a start offset of 1.

Avoid using nonpositive start offsets or negative lengths with the **SUBSTRING** function. Where possible, use the **LEFT** or **RIGHT** functions instead.

Example
These examples show the difference in the values returned by the **SUBSTRING** function based on the setting of the `ANSI_SUBSTRING` option:

```
SUBSTRING( 'abcdefgh',-2,4 );
    ansi_substring = Off ==> 'gh'
    // substring starts at second-last character
    ansi_substring = On  ==> 'gh'
```

```
    // takes the first 4 characters of
    // ???abcdefgh and discards all ?
```

```
SUBSTRING( 'abcdefgh',4,-2 );
    ansi_substring = Off ==> 'cd'
    ansi_substring = On  ==> value -2 out of range
    for destination
```

```
SUBSTRING( 'abcdefgh',0,4 );
    ansi_substring = Off ==> 'abcd'
    ansi_substring = On  ==> 'abcd'
```

ANSI_UPDATE_CONSTRAINTS Option

Controls the range of updates that are permitted.

Allowed Values
OFF, CURSORS, STRICT

Default
CURSORS

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
SAP Sybase IQ provides several extensions that allow updates that are not permitted by the ANSI SQL standard. These extensions provide powerful, efficient mechanisms for performing updates. However, in some cases, they cause behavior that is not intuitive. This behavior might produce anomalies such as lost updates if the user application is not designed to expect the behavior of these extensions.

`ANSI_UPDATE_CONSTRAINTS` controls whether updates are restricted to those permitted by the SQL92 standard.

If the option is set to `STRICT`, these updates are prevented:

- Updates of cursors containing `JOINS`
- Updates of columns that appear in an **ORDER BY** clause
- The **FROM** clause is not allowed in **UPDATE** statements.

If the option is set to CURSORS, these same restrictions are in place, but only for cursors. If a cursor is not opened with **FOR UPDATE** or **FOR READ ONLY**, the database server determines whether updates are permitted based on the SQL92 standard.

If ANSI_UPDATE_CONSTRAINTS is set to CURSORS or STRICT, cursors containing an **ORDER BY** clause default to **FOR READ ONLY**; otherwise, they continue to default to **FOR UPDATE**.

Example

This code has a different effect, depending on the setting of ANSI_UPDATE_CONSTRAINTS:

```
CREATE TABLE mmg (a CHAR(3));
CREATE TABLE mmg1 (b CHAR(3));
```

```
INSERT INTO mmg VALUES ('001');
INSERT INTO mmg VALUES ('002');
INSERT INTO mmg VALUES ('003')
INSERT INTO mmg1 VALUES ('003');
SELECT * FROM mmg;
SELECT * FROM mmg1;
```

Option 1: Set ANSI_UPDATE_CONSTRAINTS to STRICT:

```
SET OPTION public.Ansi_update_constraints = 'strict';
DELETE MMG FROM MMG1 WHERE A=B;
```

This results in an error indicating that the attempted update operation is not allowed.

Option 2: Set ANSI_UPDATE_CONSTRAINTS to CURSORS or OFF:

```
SET OPTION public.Ansi_update_constraints = 'CURSORS';  // or 'OFF'
DELETE mmg FROM mmg1 WHERE A=B;
```

In this case, the deletion should complete without the error.

See also

- *UPDATE Statement* on page 438

ALLOW_READ_CLIENT_FILE Option

Enables client-side data transfer.

Allowed values

On, Off

Default

Off

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at

the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Remarks
Enable this option to read from files on a client computer, for example by using the **READ_CLIENT_FILE** function.

ASE_BINARY_DISPLAY Option

Specifies that the display of SAP Sybase IQ binary columns is consistent with the display of Adaptive Server Enterprise binary columns.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`ASE_BINARY_DISPLAY` affects the output of the **SELECT** statement.

This option affects only columns in the IQ store. It does not affect variables, catalog store columns or SQL Anywhere columns. When this option is ON, SAP Sybase IQ displays the column in readable ASCII format; for example, 0x1234567890abcdef. When this option is OFF, SAP Sybase IQ displays the column as binary output (not ASCII).

Set **ASE_BINARY_DISPLAY** OFF to support bulk copy operations on binary data types. SAP Sybase IQ supports bulk loading of remote data via the **LOAD TABLE USING CLIENT FILE** statement.

See also

- *LOAD TABLE Statement* on page 335

ASE_FUNCTION_BEHAVIOR Option

Specifies that output of SAP Sybase IQ functions, including **INTTOHEX** and **HEXTOINT**, is consistent with the output of Adaptive Server Enterprise functions.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `ASE_BEHAVIOR_FUNCTION` is ON, some of the SAP Sybase IQ data type conversion functions, including **HEXTOINT** and **INTTOHEX**, return output that is consistent with the output of Adaptive Server Enterprise functions. The differences in the ASE and SAP Sybase IQ output, with respect to formatting and length, exist because ASE primarily uses signed 32-bit as the default and SAP Sybase IQ primarily uses unsigned 64-bit as the default.

SAP Sybase IQ does not provide support for 64-bit integer, as ASE does not have a 64-bit integer data type.

Example
In this example, the **HEXTOINT** function returns a different value based on whether `ASE_FUNCTION_BEHAVIOR` is ON or OFF.

The **HEXTOINT** function returns 4294967287 with `ASE_FUNCTION_BEHAVIOR` OFF:

```
select hextoint('fffffff7') from iq_dummy
```

The **HEXTOINT** function returns -9 with `ASE_FUNCTION_BEHAVIOR` ON:

```
select hextoint('fffffff7') from iq_dummy
```

See also

- *CONVERSION_ERROR Option [TSQL]* on page 488

AUDITING Option [database]

Enables and disables auditing in the database.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Takes effect immediately.

Description
Auditing is the recording of details about many events in the database in the transaction log. Auditing provides some security features, at the cost of some performance. When you turn on auditing for a database, you cannot stop using the transaction log. You must turn auditing off before you turn off the transaction log. Databases with auditing on cannot be started in read-only mode.

For the `AUDITING` option to work, you must set the auditing option to ON, and use the **sa_enable_auditing_type** system procedure to indicate the types of information to audit, including any combination of permission checks, connection attempts, DDL statements, public options, triggers. Auditing will not take place if:

- The `AUDITING` option is set to OFF, or
- Auditing options have been disabled.

If you set the `AUDITING` option to ON, and do not specify auditing options, all types of auditing information are recorded.

BASE_TABLES_IN_RLV_STORE Option

Registers tables in the RLV store, enabling row-level versioning. RLV-enabled tables are eligible for multiple writer concurrent access. You can override this setting at the table level using the **CREATE_TABLE** statement.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
This option turns row-level versioning on and off. When set to ON, tables are registered in the RLV store. RLV-enabled tables are optimized for real-time updates.

The **{ ENABLE | DISABLE } RLV STORE** clause of the **CREATE_TABLE** statement always overrides the **BASE_TABLES_IN_RLV_STORE** option.

BIT_VECTOR_PINNABLE_CACHE_PERCENT Option

Maximum percentage of a user's temp memory that a persistent bit-vector object can pin.

Allowed Values
0 – 100

Default
40

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`BIT_VECTOR_PINNABLE_CACHE_PERCENT` controls the percentage of a user's temp memory allocation that any one persistent bit-vector object can pin in memory. It defaults to 40%, and should not generally be changed by users.

This option is primarily for use by Sybase Technical Support. If you change the value of `BIT_VECTOR_PINNABLE_CACHE_PERCENT`, do so with extreme caution; first analyze the effect on a wide variety of queries.

See also

- *HASH_PINNABLE_CACHE_PERCENT Option* on page 535
- *SORT_PINNABLE_CACHE_PERCENT Option* on page 617

BLOCKING Option

Controls the behavior in response to locking conflicts.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `BLOCKING` is off, a transaction receives an error when it attempts a write operation and is blocked by the read lock of another transaction.

When `BLOCKING` is on, any transaction attempting to obtain a lock that conflicts with an existing lock held by another transaction waits until every conflicting lock is released or until the blocking_timeout is reached. If the lock is not released within blocking_timeout milliseconds, then an error is returned for the waiting transaction.

See also
- *BLOCKING_TIMEOUT Option* on page 480

BLOCKING_TIMEOUT Option

Controls the length of time a transaction waits to obtain a lock.

Allowed Values
Integer, in milliseconds.

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required

to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When the blocking option is on, any transaction attempting to obtain a lock that conflicts with an existing lock waits for the indicated number of milliseconds for the conflicting lock to be released. If the lock is not released within blocking_timeout milliseconds, an error is returned for the waiting transaction.

Set the option to 0 to force all transactions attempting to obtain a lock to wait until all conflicting transactions release their locks.

See also
- *BLOCKING Option* on page 480

BT_PREFETCH_MAX_MISS Option

Controls the way SAP Sybase IQ determines whether to continue prefetching B-tree pages for a given query.

Allowed Values
0 – 1000

Default
2

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Use only if instructed to do so by SAP Sybase Technical Support. For queries that use **HG** (High_Group) indexes, SAP Sybase IQ prefetches B-tree pages sequentially until it determines that prefetching is no longer useful. For some queries, it might turn off prefetching prematurely. Increasing the value of `BT_PREFETCH_MAX_MISS` makes it more likely that SAP Sybase IQ continues prefetching, but also might increase I/O unnecessarily.

If queries using **HG** indexes run more slowly than expected, try gradually increasing the value of BT_PREFETCH_MAX_MISS.

Experiment with different settings to find the setting that gives the best performance. For most queries, useful settings are in the range of 1 to 10.

See also

- *BT_PREFETCH_SIZE Option* on page 482
- *PREFETCH_BUFFER_LIMIT Option* on page 592

BT_PREFETCH_SIZE Option

Restricts the size of the read-ahead buffer for the High_Group B-tree.

Allowed Values
0 – 100. Setting to 0 disables B-tree prefetch.

Default
10

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
B-tree prefetch is activated by default for any sequential access to the High_Group index such as **INSERT**, large **DELETE**, range predicates, and DBCC (Database Consistency Checker) commands.

BT_PREFETCH_SIZE limits the size of the read-ahead buffer for B-tree pages. Reducing prefetch size frees buffers, but also degrades performance at some point. Increasing prefetch size might have marginal returns. This option should be used in conjunction with the options PREFETCH_GARRAY_PERCENT, GARRAY_INSERT_PREFETCH_SIZE, and GARRAY_RO_PREFETCH_SIZE for non-unique High_Group indexes.

See also

- *GARRAY_INSERT_PREFETCH_SIZE Option* on page 533
- *GARRAY_RO_PREFETCH_SIZE Option* on page 535
- *PREFETCH_GARRAY_PERCENT Option* on page 593

BTREE_PAGE_SPLIT_PAD_PERCENT Option

Determines per-page fill factor during page splits for B-Tree structures.

Allowed Values
0 – 90

Default
50

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
B-Tree structures are used by the HG, LF, DT, TIME, and DTTM indexes. Splits of a B-Tree page try to leave the specified percentage empty to avoid splitting when new keys are inserted into the index.

Indexes reserve storage at the page level that can be allocated to new keys as additional data is inserted. Reserving space consumes additional disk space, but can help the performance of incremental inserts. If future plans include incremental inserts, and the new rows do not have values that are already present in the index, a nonzero value for `GARRAY_PAGE_SPLIT_PAD_PERCENT` may improve incremental insert performance.

If you do not plan to incrementally update the index, you can reduce the value of this option to save disk space.

See also

- *GARRAY_FILL_FACTOR_PERCENT Option* on page 532
- *GARRAY_PAGE_SPLIT_PAD_PERCENT Option* on page 534

CACHE_AFFINITY_PERCENT Option

The maximum percentage of main cache to use for affinity. Non-affinity data can use this area if insufficient affinity data exists.

Allowed Values
0 - 100 %

Default
70

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. The database server must be shut down and restarted for the change to take effect

Description
This option defines the percentage of the buffer cache used for affinitized data buffers. SAP Sybase IQ buffer caches are organized as a long MRU/LRU chain. Non-affinitized data buffers are put into the chain after affinitized buffers when this percentage is non-zero, so that affinitized data stay in the cache longer than non-affinitized data. If there are insufficient affinitized data buffers to fill this entire percentage, non-affinitized data may consume the remainder.

Note: Before changing this option, check the value of the `WASH_AREA_BUFFERS_PERCENT` option. `WASH_AREA_BUFFERS_PERCENT` affects the LRU side of the buffer cache and `CACHE_AFFINITY_PERCENT` affects the MRU side. The total of these two values cannot exceed 100 percent.

CACHE_PARTITIONS Option

Sets the number of partitions to be used for the main and temporary buffer caches.

Allowed Values
0, 1, 2, 4, 8, 16, 32, 64

- 0 – (default) SAP Sybase IQ computes the number of partitions automatically as `number_of_cpus/8`, rounded to the nearest power of 2, up to a maximum of 64.
- 1 – one partition only; this value disables partitioning.
- 2 through 64 – number of partitions; must be a power of 2.

Default
0

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect for the current database the next time you start the database server.

Description
Partitioning the buffer cache can sometimes improve performance on systems with multiple CPUs by reducing lock contention. Normally, you should rely on the value that SAP Sybase

IQ calculates automatically, which is based on the number of CPUs on your system. However, if you find that load or query performance in a multi-CPU configuration is slower than expected, you might be able to improve it by setting a different value for CACHE_PARTITIONS.

Both the number of CPUs and the platform can influence the ideal number of partitions. Experiment with different values to determine the best setting for your configuration.

The value you set for CACHE_PARTITIONS applies to both the main and temp buffer caches. The absolute maximum number of partitions is 64, for each buffer cache.

The **-iqpartition start_iq** server option sets the partition limit at the server level. If you specify **-iqpartition** at server startup, it overrides the CACHE_PARTITIONS setting.

The number of partitions does not affect other buffer cache settings. It also does not affect statistics collected by the IQ monitor; statistics for all partitions are rolled up and reported as a single value.

Example
In a system with 100 CPUs, if you do not set CACHE_PARTITIONS, SAP Sybase IQ automatically sets the number of partitions to 16:

100 cpus/8 = 12, rounded to 16.

With this setting, there are 16 partitions for the main cache and 16 partitions for the temp cache.

In the same system with 100 CPUs, to explicitly set the number of partitions to 8, specify:

```
SET OPTION "PUBLIC".CACHE_PARTITIONS=8
```

CHAINED Option [TSQL]

Controls transaction mode in the absence of a **BEGIN TRANSACTION** statement.

Allowed Values
ON, OFF

Default
ON

OFF for Open Client and JDBC connections

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Controls the Transact-SQL transaction mode. In unchained mode (`CHAINED` = OFF) each statement is committed individually unless an explicit **BEGIN TRANSACTION** statement is executed to start a transaction. In chained mode (`CHAINED` = ON) a transaction is implicitly started before any data retrieval or modification statement. For Adaptive Server Enterprise, the default setting is OFF.

CHECKPOINT_TIME Option

Set the maximum length of time, in minutes, that the database server runs without doing a checkpoint.

Allowed Values
Integer

Default
60

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must shut down and restart the database server for the change to take effect.

Description
This option is used with the `RECOVERY_TIME` option to decide when checkpoints should be done.

See also
- *RECOVERY_TIME Option* on page 606

CIS_ROWSET_SIZE Option

Sets the number of rows that are returned from remote servers for each fetch.

Allowed Values
Integer

Default
50

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at

the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option sets the ODBC **FetchArraySize** value when you are using ODBC to connect to a remote database server.

CLOSE_ON_ENDTRANS Option [TSQL]

Controls closing of cursors at the end of a transaction.

Allowed Values
ON

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `CLOSE_ON_ENDTRANS` is set to ON (the default and only value allowed), cursors are closed at the end of a transaction, which is Transact-SQL compatible behavior.

CONTINUE_AFTER_RAISERROR Option [TSQL]

Controls behavior following a **RAISERROR** statement.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The **RAISERROR** statement is used within procedures to generate an error. When CONTINUE_AFTER_RAISERROR is set to OFF, the execution of the procedure is stopped when the **RAISERROR** statement is encountered.

When CONTINUE_AFTER_RAISERROR is ON, the **RAISERROR** statement no longer signals an execution-ending error. Instead, the **RAISERROR** status code and message are stored and the most recent **RAISERROR** is returned when the procedure completes. If the procedure that caused the **RAISERROR** was called from another procedure, the **RAISERROR** is not returned until the outermost calling procedure terminates.

Intermediate **RAISERROR** statuses and codes are lost after the procedure terminates. If, at return time, an error occurs along with the **RAISERROR**, then the error information is returned and the **RAISERROR** information is lost. The application can query intermediate **RAISERROR** statuses by examining @@error global variable at different execution points.

The setting of CONTINUE_AFTER_RAISERROR is used to control behavior following a **RAISERROR** statement only if the ON_TSQL_ERROR option is set to CONDITIONAL (the default). If you set the ON_TSQL_ERROR option to STOP or CONTINUE, the ON_TSQL_ERROR setting takes precedence over the CONTINUE_AFTER_RAISERROR setting.

See also
- *ON_TSQL_ERROR Option [TSQL]* on page 586

CONVERSION_ERROR Option [TSQL]

Controls reporting of data type conversion failures on fetching information from the database.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option controls whether data type conversion failures, when data is fetched from the database or inserted into the database, are reported by the database as errors (`CONVERSION_ERROR` set to ON), or as warnings (`CONVERSION_ERROR` set to OFF).

When `CONVERSION_ERROR` is set to ON, the `SQLE_CONVERSION_ERROR` error is generated.

If the option is set to OFF, the warning SQLE_CANNOT_CONVERT is produced. Each thread doing data conversion for a **LOAD** statement writes at most one warning message to the `.iqmsg` file.

If conversion errors are reported as warnings only, the NULL value is used in place of the value that could not be converted. In Embedded SQL, an indicator variable is set to -2 for the column or columns that cause the error.

CONVERSION_MODE Option

Restricts implicit conversion between binary data types (`BINARY`, `VARBINARY`, and `LONG BINARY`) and other non-binary data types (`BIT`, `TINYINT`, `SMALLINT`, `INT`, `UNSIGNED INT`, `BIGINT`, `UNSIGNED BIGINT`, `CHAR`, `VARCHAR`, and `LONG VARCHAR`) on various operations.

Allowed Values
0, 1

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

The default value of 0 maintains implicit conversion behavior prior to version 12.7. Setting CONVERSION_MODE to 1 restricts implicit conversion of binary data types to any other non-binary data type on **INSERT**, **UPDATE**, and in queries. The restrict binary conversion mode also applies to **LOAD TABLE** default values and **CHECK** constraint. The use of this option prevents implicit data type conversions of encrypted data that would result in semantically meaningless operations.

Users must be specifically licensed to use the encrypted column functionality of the SAP Sybase IQ Advanced Security Option.

Implicit Conversion Restrictions

The CONVERSION_MODE option restrict binary mode value of 1 (CONVERSION_MODE = 1) restricts implicit conversion for these operations:

- **LOAD TABLE** with **CHECK** constraint or default value
- **INSERT...SELECT**, **INSERT...VALUE**, and **INSERT...LOCATION**
- Certain types of **UPDATE**
- Certain types of **INSERT** and **UPDATE** via updatable cursor
- All aspects of queries in general

Restrict Implicit Binary Conversion Mode for LOAD TABLE

The restrict implicit binary conversion mode (CONVERSION_MODE set to 1) applies to **LOAD TABLE** with **CHECK** constraint or default value.

Example

```
CREATE TABLE t3 (c1 INT,
    csi SMALLINT,
    cvb VARBINARY(2),
    CHECK (csi<cvb));
SET TEMPORARY OPTION CONVERSION_MODE = 1;
```

This request:

```
LOAD TABLE t3(c1 ',', csi ',', cvb ',')
    FROM '/s1/mydata/t3.inp'
    QUOTES OFF ESCAPES OFF
    ROW DELIMITED BY '\n'
```

fails with the message:

```
"Invalid data type comparison in predicate
(t3.csi < t3.cvb), [-1001013] ['QFA13']"
```

Restrict Implicit Binary Conversion Mode for INSERT

The restrict implicit binary conversion mode (CONVERSION_MODE set to 1) applies to **INSERT...SELECT**, **INSERT...VALUE**, and **INSERT...LOCATION.**

Example

```
CREATE TABLE t1 (c1 INT PRIMARY KEY,
    cbt BIT NULL,
    cti TINYINT,
    csi SMALLINT,
    cin INTEGER,
    cui UNSIGNED INTEGER,
    cbi BIGINT,
    cub UNSIGNED BIGINT,
    cch CHAR(10),
    cvc VARCHAR(10),
    cbn BINARY(8),
    cvb VARBINARY(8),
    clb LONG BINARY,
    clc LONG VARCHAR);

CREATE TABLE t2 (c1 INT PRIMARY KEY,
    cbt BIT NULL,
    cti TINYINT,
    csi SMALLINT,
    cin INTEGER,
    cui UNSIGNED INTEGER,
    cbi BIGINT,
    cub UNSIGNED BIGINT,
    cch CHAR(10),
    cvc VARCHAR(10),
    cbn BINARY(8),
    cvb VARBINARY(8),
    clb LONG BINARY,
    clc LONG VARCHAR);

CREATE TABLE t4 (c1 INT, cin INT DEFAULT 0x31);

SET TEMPORARY OPTION CONVERSION_MODE = 1;
```

This request:

```
INSERT INTO t1(c1, cvb) SELECT 99, cin FROM T2
WHERE c1=1
```

fails with the message:

```
"Unable to convert column 'cvb' to the requested
datatype (varbinary) from datatype (integer).
[-1013043] ['QCA43']"
```

Restrict Implicit Binary Conversion Mode for UPDATE

The restrict implicit binary conversion mode (CONVERSION_MODE set to 1) applies to certain types of **UPDATE**.

Restrict implicit binary conversion mode applies to:

- **UPDATE SET VALUE FROM** *expression* (including constant)
- **UPDATE SET VALUE FROM** *other column*
- **UPDATE SET VALUE FROM** *host variable*
- **JOIN UPDATE SET VALUE FROM** *column of other table*

Example

This request:

```
UPDATE t1 SET cbi=cbn WHERE c1=1
```

fails with the message:

```
"Unable to implicitly convert column 'cbi' to datatype
(bigint) from datatype (binary). [-1000187] ['QCB87']"
```

Restrict Implicit Binary Conversion Mode for Positioned INSERT and Positioned UPDATE via Updatable Cursor

The restrict implicit binary conversion mode (CONVERSION_MODE set to 1) applies to certain types of **INSERT** and **UPDATE** via updatable cursor.

Restrict implicit binary conversion mode applies to:

- **PUT** *cursor-name* **USING** … *host-variable*
- Positioned **UPDATE** from another column
- Positioned **UPDATE** from a constant
- Positioned **UPDATE** from a host variable

Restrict Implicit Binary Conversion Mode for Queries

The restrict implicit binary conversion mode (CONVERSION_MODE set to 1) applies to all aspects of queries in general.

Comparison Operators

When CONVERSION_MODE = 1, the restriction applies to these operators:

- =, !=, <, <=, >=, <>, !>, !<
- BETWEEN … AND
- IN

used in a search condition for these clauses:

- **WHERE** clause

- **HAVING** clause
- **CHECK** clause
- **ON** phrase in a join
- **IF**/**CASE** expression

Example
This query:

```
SELECT COUNT(*) FROM T1
WHERE cvb IN (SELECT csi FROM T2)
```

fails with the message:

```
"Invalid data type comparison in predicate
(t1.cvb IN (SELECT t1.csi ...)), [-1001013]
['QFA13']"
```

String Functions
When `CONVERSION_MODE` = 1, the restriction applies to these string functions:

- **CHAR**
- **CHAR_LENGTH**
- **DIFFERENCE**
- **LCASE**
- **LEFT**
- **LOWER**
- **LTRIM**
- **PATINDEX**
- **RIGHT**
- **RTRIM**
- **SIMILAR**
- **SORTKEY**
- **SOUNDEX**
- **SPACE**
- **STR**
- **TRIM**
- **UCASE**
- **UPPER**

Example
This query:

```
SELECT ASCII(cvb) FROM t1 WHERE c1=1
```

fails with the message:

```
"Data exception - data type conversion is not
possible. Argument to ASCII must be string,
[-1009145] ['QFA2E']"
```

The following functions allow either a string argument or a binary argument. When CONVERSION_MODE = 1, the restriction applies to mixed type arguments, that is, one argument is string and the other argument is binary.

- **INSERTSTR**
- **LOCATE**
- **REPLACE**
- **STRING**
- **STUFF**

Example

This query:

```
SELECT STRING(cvb, cvc) FROM t1 WHERE c1=1
```

where the column cvb is defined as VARBINARY and the column cvc is defined as VARCHAR, fails

with the message:

```
"Data exception - data type conversion is not
possible. Arguments to STRING must be all binary
or all string, [-1009145] ['QFA2E']"
```

The restriction does not apply to these string functions:

- **BIT_LENGTH**
- **BYTE_LENGTH**
- **CHARINDEX**
- **LENGTH**
- **OCTET_LENGTH**
- **REPEAT**
- **REPLICATE**
- **SUBSTRING**

Arithmetic Operations and Functions

When CONVERSION_MODE = 1, the restriction applies to these operators used in arithmetic operations:

+, -, *, /

The restriction applies to these bitwise operators used in bitwise expressions:

& (AND), | (OR), ^ (XOR)

The restriction also applies to integer arguments of these functions:

- **ROUND**
- "**TRUNCATE**"
- **TRUNCNUM**

Example
This query:

```
SELECT ROUND(4.4, cvb) FROM t1 WHERE C1=1
```

fails with the message:

```
"Data exception - data type conversion is not
possible. Second Argument to ROUND cannot be
converted into an integer, [-1009145] ['QFA2E']"
```

Integer Argument to Various Functions
When CONVERSION_MODE = 1, the restriction applies to integer argument of these functions:

- **ARGN**
- **SUBSTRING**
- **DATEADD**
- **YMD**

Example
This query:

```
SELECT ARGN(cvb, csi, cti) FROM t1 WHERE c1=1
```

fails with the message:

```
"Data exception - data type conversion is not
possible. First Argument to ARGN cannot be converted
to an integer, [-1009145] ['QFA2E']"
```

Analytical Functions, Aggregate Functions, and Numeric Functions
When CONVERSION_MODE = 1, no further restriction applies to analytical functions, aggregate functions, and numeric functions that require numeric expressions as arguments.

CONVERT_VARCHAR_TO_1242 Option

Converts pre-version 12.4.2 VARCHAR data to compressed format.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Takes effect when you run **sp_iqcheckdb** in any mode.

Description
Helps further compress data and improve performance, especially for databases with many variable character strings.

Set this option and then run **sp_iqcheckdb** only once, and only for `VARCHAR` columns that were created before version 12.4.2.

COOPERATIVE_COMMIT_TIMEOUT Option

Governs when a `COMMIT` entry in the transaction log is written to disk.

Allowed Values
Integer, in milliseconds

Default
250

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option only has meaning when `COOPERATIVE_COMMITS` is set to ON. The database server waits for the specified number of milliseconds for other connections to fill a page of the log before writing to disk. The default setting is 250 milliseconds.

See also

- *COOPERATIVE_COMMITS Option* on page 497

COOPERATIVE_COMMITS Option

Controls when commits are written to disk.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If `COOPERATIVE_COMMITS` is set to OFF, a **COMMIT** is written to disk as soon as the database server receives it, and the application is then allowed to continue.

If `COOPERATIVE_COMMITS` is set to ON, the default, the database server does not immediately write the **COMMIT** to the disk. Instead, it requires the application to wait for a maximum length set by the `COOPERATIVE_COMMIT_TIMEOUT` option for something else to put on the pages before the commit is written to disk.

Setting `COOPERATIVE_COMMITS` to ON, and increasing the `COOPERATIVE_COMMIT_TIMEOUT` setting increases overall database server throughput by cutting down the number of disk I/Os, but at the expense of a longer turnaround time for each individual connection.

See also
- *COOPERATIVE_COMMIT_TIMEOUT Option* on page 496

CREATE_HG_WITH_EXACT_DISTINCTS

Determines whether the database engine creates tiered `HG` or single-tiered `HG` indexes.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`CREATE_HG_WITH_EXACT_DISTINCTS` determines whether the database engine creates `HG` indexes as single `HG` or tiered `HG`:

- If `CREATE_HG_WITH_EXACT_DISTINCTS='ON'`, all subsequent `HG` indexes explicitly created with a **CREATE INDEX** command or implicitly creating or altering a table with a PRIMARY KEY or a FOREIGN KEY declaration, will be non-tiered HG indexes.
- If `CREATE_HG_WITH_EXACT_DISTINCTS='OFF'`, all subsequent `HG` indexes explicitly created with a **CREATE INDEX** command or implicitly creating or altering a table with a PRIMARY KEY or a FOREIGN KEY declaration, will be tiered `HG`.

This option is ON by default in all newly created 16.0 databases, and all 16.0 database upgraded from SAP Sybase IQ 15.x. To take advantage of the new tiered structure, set this option to OFF. Use **sp_iqrebuildindex** to convert non-tiered `HG` indexes to tiered `HG` and vice-versa.

CURSOR_WINDOW_ROWS Option

Defines the number of cursor rows to buffer.

Allowed Values
20 – 100000

Default
200

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set only for individual connections or the PUBLIC role. You must shut down and restart the database server for the change to take effect.

Description

When an application opens a cursor, SAP Sybase IQ creates a FIFO (first-in, first-out) buffer to hold the data rows generated by the query. `CURSOR_WINDOW_ROWS` defines how many rows can be put in the buffer. If the cursor is opened in any mode other than NO SCROLL, SAP Sybase IQ allows for backward scrolling for up to the total number of rows allowed in the buffer before it must restart the query. This is not true for NO SCROLL cursors, as they do not allow backward scrolling.

For example, with the default value for this option, the buffer initially holds rows 1 through 200 of the query result set. If you fetch the first 300 rows, the buffer holds rows 101 through 300. You can scroll backward or forward within that buffer with very little overhead cost. If you scroll before row 101, SAP Sybase IQ restarts that query until the required row is back in the buffer. This can be an expensive operation to perform, so your application should avoid it where possible. An alternative is to increase the value for `CURSOR_WINDOW_ROWS` to accommodate a larger possible scrolling area; however, the default setting of 200 is sufficient for most applications.

DATE_FIRST_DAY_OF_WEEK Option

Determines the first day of the week.

Allowed Values

0 – 6

Default

0 (Sunday)

Scope

Requires the SET ANY PUBLIC OPTION system privilege to set this option for PUBLIC or for other user or role. Can be set for individual connections or for PUBLIC role.

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set for an individual connection or for the PUBLIC role. You must shut down and restart the database server for the change to take effect.

Description
This option specifies which day is the first day of the week. By default, Sunday is day 1, Monday is day 2, Tuesday is day 3, and so on:

Table 19. DATE_FIRST_DAY_OF_WEEK Valid Values

Value	First Day
0	Sunday
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday

For example, if you change the value of `DATE_FIRST_DAY_OF_WEEK` to 3, Wednesday becomes day 1, Thursday becomes day 2, and so on. This option only affects the **DOW** and **DATEPART** functions.

The SQL Anywhere option `FIRST_DAY_OF_WEEK` performs the same function, but assigns the values 1 through 7 instead of 0 through 6. 1 stands for Monday and 7 for Sunday (the default).

DATE_FORMAT Option

Sets the format used for dates retrieved from the database.

Allowed Values
String

Default
'YYYY-MM-DD'. This corresponds to ISO date format specifications.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The format is a string using these symbols:

Table 20. Symbols Used in DATE_FORMAT String

Symbol	Description
yy	2-digit year
yyyy	4-digit year
mm	2-digit month, or 2-digit minutes if following a colon (as in 'hh:mm')
mmm	3-character name of month
mmmm[m...]	Character long form for months—as many characters as there are m's, until the number of m's specified exceeds the number of characters in the month's name.
d	Single-digit day of week, (0 = Sunday, 6 = Saturday)
dd	2-digit day of month
ddd	3-character name of the day of week.
dddd[d...]	Character long form for day of the week—as many characters as there are d's, until the number of d's specified exceeds the number of characters in the day's name.
jjj	Day of the year, from 1 to 366

Note: Multibyte characters are not supported in date format strings. Only single-byte characters are allowed, even when the collation order of the database is a multibyte collation order like 932JPN. Use the concatenation operator to include multibyte characters in date format strings. For example, if '*?* represents a multibyte character, use the concatenation operator to move the multibyte character outside of the date format string:

```
SELECT DATEFORMAT (StartDate, 'yy') + '?'
FROM Employees;
```

Each symbol is substituted with the appropriate data for the date being formatted. Any format symbol that represents character rather than digit output can be put in uppercase which causes the substituted characters to also be in uppercase. For numbers, using mixed case in the format string suppresses leading zeros.

You can control the padding of numbers by changing the case of the symbols. Same-case values (MM, mm, DD, or dd) all pad number with zeros. Mixed-case (Mm, mM, Dd, or dD) cause the number to not be zero-padded; the value takes as much room as required. For example:

```
SELECT dateformat ( cast ('2011/01/01' as date ), 'yyyy/Mm/Dd' )
```

returns this value:

```
2011/1/1
```

Examples

This table illustrates `DATE_FORMAT` settings, together with the output from this statement, executed on Saturday May 21, 2011:

```
SELECT CURRENT DATE
```

Table 21. DATE_FORMAT Settings

DATE_FORMAT	SELECT CURRENT DATE
yyyy/mm/dd/ddd	2011/05/21/sat
jjj	141
mmm yyyy	may 2011
mm-yyyy	05-2011

See also

- *RETURN_DATE_TIME_AS_STRING Option* on page 607
- *TIME_FORMAT Option* on page 642

DATE_ORDER Option

Controls the interpretation of date formats.

Allowed Values

'MDY', 'YMD', or 'DMY'

Default

'YMD'. This corresponds to ISO date format specifications.

'MDY' for OPne Client and DJBC connections

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
DATE_ORDER is used to determine whether 10/11/12 is Oct 11 1912, Nov 12 1910, or Nov 10 1912. The option can have the value 'MDY', 'YMD', or 'DMY'.

DBCC_LOG_PROGRESS Option

Reports the progress of the **sp_iqcheckdb** system stored procedure.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When DBCC_LOG_PROGRESS is ON, the **sp_iqcheckdb** system stored procedure sends progress messages to the IQ message file. These messages allow the user to follow the progress of the **sp_iqcheckdb** operation.

Stored procedures are documented in *Reference: Building Blocks, Tables, and Procedures*.

Examples
Sample progress log output of the command `sp_iqcheckdb 'check database'`:

```
IQ Utility Check Database
Start CHECK STATISTICS table: tloansf
Start CHECK STATISTICS for field: aqsn_dt
Start CHECK STATISTICS processing index:
IQ_IDX_T444_C1_FP
Start CHECK STATISTICS processing index:
tloansf_aqsn_dt_HNG
Done CHECK STATISTICS field: aqsn_dt
```

Sample progress log output of the command `sp_iqcheckdb 'allocation table nation'`:

```
Start ALLOCATION table: nation
Start ALLOCATION processing index: nationhg1
```

```
Done ALLOCATION table: nation
Done ALLOCATION processing index: nationhg1
```

DBCC_PINNABLE_CACHE_PERCENT Option

Controls the percent of the cache used by the **sp_iqcheckdb** system stored procedure.

Allowed Values
0 – 100

Default
50

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect at the next execution of **sp_iqcheckdb**.

Description
The **sp_iqcheckdb** system stored procedure works with a fixed number of buffers, as determined by this option. By default, a large percentage of the cache is reserved to maximize **sp_iqcheckdb** performance.

Stored procedures are documented in *Reference: Building Blocks, Tables, and Procedures*.

DEBUG_MESSAGES Option

Controls whether or not **MESSAGE** statements that include a `DEBUG ONLY` clause are executed.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required

to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option allows you to control the behavior of debugging messages in stored procedures that contain a **MESSAGE** statement with the `DEBUG ONLY` clause specified. By default, this option is set to OFF and debugging messages do not appear when the **MESSAGE** statement is executed. By setting `DEBUG_MESSAGES` to ON, you can enable the debugging messages in all stored procedures.

Note: DEBUG ONLY messages are inexpensive when the `DEBUG_MESSAGES` option is set to OFF, so these statements can usually be left in stored procedures on a production system. However, they should be used sparingly in locations where they would be executed frequently; otherwise, they might result in a small performance penalty.

See also

- *MESSAGE Statement* on page 357

DEDICATED_TASK Option

Dedicates a request handling task to handling requests from a single connection.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set as a temporary option only, for an individual connection or for the PUBLIC role, for the duration of the current connection.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
When the `DEDICATED_TASK` connection option is set to ON, a request handling task is dedicated exclusively to handling requests for the connection. By pre-establishing a connection with this option enabled, you can gather information about the state of the database server if it becomes otherwise unresponsive.

DEFAULT_DBSPACE Option

Changes the default dbspace where tables are created.

Allowed Values
String containing a dbspace name

Default
" (the empty string)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`DEFAULT_DBSPACE` allows the administrator to set the default dbspace for a role or user or allows a user to set the user's own default dbspace.

`IQ_SYSTEM_TEMP` is always used for global temporary tables unless a table IN clause is used that specifies `SYSTEM`, in which case an SA global temporary table is created.

At database creation, the system dbspace, IQ_SYSTEM_MAIN, is created and is implied when the `PUBLIC.DEFAULT_DBSPACE` option setting is empty or explicitly set to `IQ_SYSTEM_MAIN`. Immediately after creating the database, create a second main dbspace, revoke CREATE privilege in dbspace `IQ_SYSTEM_MAIN` from `PUBLIC`, grant CREATE in dbspace for the new main dbspace to selected users or `PUBLIC`, and set `PUBLIC.DEFAULT_DBSPACE` to the new main dbspace. For example:

```
CREATE DBSPACE user_main USING FILE user_main
'user_main1' SIZE 10000;
GRANT CREATE ON user_main TO PUBLIC;
REVOKE CREATE ON IQ_SYSTEM_MAIN FROM PUBLIC;
SET OPTION PUBLIC.DEFAULT_DBSPACE = 'user_main';
```

Example
In this example, CONNECT and RESOURCE privileges on all dbspaces are granted to users `usrA` and `usrB`, and each of these users is granted CREATE privilege on a particular dbspace:

```
GRANT CONNECT, RESOURCE TO usrA, usrB
   IDENTIFIED BY pwdA, pwdB;
```

```
GRANT CREATE ON dbsp1 TO usrA;
GRANT CREATE ON dbsp3 TO usrB;
SET OPTION "usrA".default_dbspace = 'dbsp1';
SET OPTION "usrB".default_dbspace = 'dbsp3';
SET OPTION "PUBLIC".default_dbspace = dbsp2;

CREATE TABLE "DBA".t1(c1 int, c2 int);
INSERT INTO t1 VALUES (1, 1);
INSERT INTO t1 VALUES (2, 2);
COMMIT;
```

`UsrA` connects:

```
CREATE TABLE "UsrA".t1(c1 int, c2 int);
INSERT INTO t1 VALUES (1, 1);
INSERT INTO t1 VALUES (2, 2);
COMMIT;
```

`UsrB` connects:

```
CREATE TABLE "UsrB".t1(c1 int, c2 int);
INSERT INTO t1 VALUES (1, 1);
INSERT INTO t1 VALUES (2, 2);
COMMIT;
```

DBA connects:

```
SELECT Object, DbspaceName, ObjSize
FROM sp_iqindexinfo();
```

sp_iqindexinfo result:

```
DBA.t1                              dbsp2        200k
DBA.t1.ASIQ_IDX_T730_C1_FP          dbsp2        288k
DBA.t1.ASIQ_IDX_T730_C2_FP          dbsp2        288k
usrA.t1                             dbsp1        200k
usrA.t1.ASIQ_IDX_T731_C1_FP         dbsp1        288k
usrA.t1.ASIQ_IDX_T731_C2_FP         dbsp1        288k
usrB.t1                             dbsp3        200k
usrB.t1.ASIQ_IDX_T732_C1_FP         dbsp3        288k
usrB.t1.ASIQ_IDX_T732_C2_FP         dbsp3        288k
```

DEFAULT_DISK_STRIPING Option

Sets the default disk striping value for all dbspaces.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
By default, disk striping is ON for all dbspaces in the IQ main store. This option is used only by **CREATE DBSPACE** and defines the default striping value, if **CREATE DBSPACE** does not specify striping.

See also
- *CREATE DBSPACE Statement* on page 114

DEFAULT_HAVING_SELECTIVITY_PPM Option

Provides default selectivity estimates to the optimizer for most **HAVING** clauses in parts per million.

Allowed Values
0 – 1000000

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`DEFAULT_HAVING_SELECTIVITY_PPM` sets the selectivity for **HAVING** clauses, overriding optimizer estimates. A **HAVING** clause filters the results of a **GROUP BY** clause or a query with a select list consisting solely of aggregate functions. When `DEFAULT_HAVING_SELECTIVITY_PPM` is set to the default of 0, the optimizer estimates how many rows are filtered by the **HAVING** clause. Sometimes the IQ optimizer does not have sufficient information to choose an accurate selectivity, and in these cases chooses a generic estimate of 40%. `DEFAULT_HAVING_SELECTIVITY_PPM` allows a user to replace the optimizer estimate for all **HAVING** predicates in a query.

Users can also specify the selectivity of individual `HAVING` clauses in the query, as described in *Reference: Building Blocks, Tables, and Procedures*.

DEFAULT_ISQL_ENCODING Option [Interactive SQL]

Specifies the code page used by **READ** and **OUTPUT** statements.

Allowed Values
identifier or *string*

Default
Use system code page (empty string)

Scope
Can only be set as a temporary option, for the duration of the current connection.

Description
`DEFAULT_ISQL_ENCODING` is used to specify the code page to use when reading or writing files. It cannot be set permanently. The default code page is the default code page for the platform you are running on. On English Windows machines, the default code page is 1252.

Interactive SQL determines the code page that is used for a particular **OUTPUT** or **READ** statement as follows, where code page values occurring earlier in the list take precedence over those occurring later in the list:

- The code page specified in the **ENCODING** clause of the **OUTPUT** or **READ** statement
- The code page specified with the `DEFAULT_ISQL_ENCODING` option (if this option is set)
- The default code page for the computer on which Interactive SQL is running

Example
Set the encoding to UTF-16 (for reading Unicode files):

```
SET TEMPORARY OPTION DEFAULT_ISQL_ENCODING = 'UTF-16'
```

See also

- *OUTPUT Statement [Interactive SQL]* on page 362
- *READ Statement [Interactive SQL]* on page 373

DEFAULT_KB_PER_STRIPE Option

Sets an upper threshold in KB on the amount to write to a stripe before write operations move on to the next stripe.

This setting is the default size for all dbspaces in the IQ main store.

Allowed Values
1 to maximum integer

Default
1

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
The default value of 1KB means that one page is compressed and that the compressed page is written to disk as a single operation. Whatever the chosen page size, the next operation writes to the next dbfile in that dbspace.

To write multiple pages to the same stripe before moving to the next stripe, change the `DEFAULT_KB_PER_STRIPE` setting. For example, if the page size is 128KB, and `DEFAULT_KB_PER_STRIPE` set to 512KB, SAP Sybase IQ queues up page writes and writes to disk after reaching the minimum of 512KB of compressed pages.

This option is used only by **CREATE DBSPACE** and defines the default disk striping size for dbspaces in the IQ main store, if **CREATE DBSPACE** does not specify a stripe size.

See also
- *CREATE DBSPACE Statement* on page 114

DEFAULT_LIKE_MATCH_SELECTIVITY_PPM Option

Provides default selectivity estimates (in parts per million) to the optimizer for most **LIKE** predicates.

Allowed Values
0 to 1000000

Default
150000

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

DEFAULT_LIKE_MATCH_SELECTIVITY_PPM sets the default selectivity for generic **LIKE** predicates, for example, LIKE '*string*%*string*' where % is a wildcard character.

The optimizer relies on this option when other selectivity information is not available and the match string does not start with a set of constant characters followed by a single wildcard.

If the column has either an LF index or a 1- or 2- or 3-byte FP index, the optimizer can get exact information and does not need to use this value.

Users can also specify selectivity in the query. User-supplied condition hints are described in *Reference: Building Blocks, Tables, and Procedures*.

See also

- *DEFAULT_LIKE_RANGE_SELECTIVITY_PPM Option* on page 511
- *FP_LOOKUP_SIZE Option* on page 523

DEFAULT_LIKE_RANGE_SELECTIVITY_PPM Option

Provides default selectivity estimates (in parts per million) to the optimizer for leading constant **LIKE** predicates.

Allowed Values

1 to 1000000

Default

150000

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

DEFAULT_LIKE_RANGE_SELECTIVITY_PPM sets the default selectivity for **LIKE** predicates, of the form LIKE '*string*%' where the match string is a set of constant characters followed by a single wildcard character (%). The optimizer relies on this option when other selectivity information is not available.

If the column has either an LF index or a 1- or 2- or 3-byte FP index, the optimizer can get exact information and does not need to use this value.

Users can also specify selectivity in the query. User-supplied condition hints are described in *Reference: Building Blocks, Tables, and Procedures*.

See also

- *DEFAULT_LIKE_MATCH_SELECTIVITY_PPM Option* on page 510
- *FP_LOOKUP_SIZE Option* on page 523

DEFAULT_PROXY_TABLE_ROW_COUNT Option

Enables you to override the default estimate of the number of rows to return from a proxy table.

Allowed Values
0 to 4294967295

Default
200000

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

DEFAULT_TABLE_UDF_ROW_COUNT Option

Enables you to override the default estimate of the number of rows to return from a table UDF (either a C, C++, or Java table UDF).

Allowed Values
0 to 4294967295

Default
200000

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
A table UDF can use the **DEFAULT_TABLE_UDF_ROW_COUNT** option to give the query processor an estimate for the number of rows that a table UDF will return. This is the only way a Java table UDF can convey this information. However, for a C or C++ table UDF, the UDF developer should consider publishing this information in the `describe` phase using the `EXTFNAPIV4_DESCRIBE_PARM_TABLE_NUM_ROWS` describe parameter to publish the number of rows it expects to return. The value of `EXTFNAPIV4_DESCRIBE_PARM_TABLE_NUM_ROWS` always overrides the value of the **DEFAULT_PROXY_TABLE_UDF_ROW_COUNT** option.

DELAYED_COMMIT_TIMEOUT Option

Determines when the server returns control to an application following a **COMMIT**.

Allowed Values
Integer, in milliseconds.

Default
500

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option is ignored by SAP Sybase IQ, since `DELAYED_COMMITS` can only be set OFF.

DELAYED_COMMITS Option

Determines when the server returns control to an application following a **COMMIT**.

Allowed Values
OFF

Default
OFF. This corresponds to ISO COMMIT behavior.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When set to OFF (the only value allowed by SAP Sybase IQ), the application must wait until the **COMMIT** is written to disk. This option must be set to OFF for ANSI/ISO COMMIT behavior.

DISABLE_RI_CHECK Option

Allows load, insert, update, or delete operations to bypass the referential integrity check, improving performance.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Users are responsible for ensuring that no referential integrity violation occurs during requests while `DISABLE_RI_CHECK` is set to ON.

DIVIDE_BY_ZERO_ERROR Option [TSQL]

Controls the reporting of division by zero.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option indicates whether division by zero is reported as an error. If the option is set ON, division by zero results in an error with SQLSTATE 22012.

If the option is set OFF, division by zero is not an error; a NULL is returned.

DQP_ENABLED Option

Temporary database option **DQP_ENABLED** allows you to enable or disable distributed query processing at the connection level.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
You can set the temporary database option **DQP_ENABLED** to OFF to disable DQP for the current connection. You can set the option to ON (the default value) to enable DQP for the current connection, but only when DQP is enabled for the user by that user's login policy for the logical server of the current connection.

Setting **DQP_ENABLED** to ON results in an error if DQP is disabled based upon the user's login policy:

```
Invalid setting for option 'DQP_ENABLED'
```

Note: Any changes you make to a user's login policy options affect new connections only. Login policy option settings for existing connections are based upon the time the connection was initially established.

DQP_ENABLED_OVER_NETWORK Option

Temporary database option **DQP_ENABLED_OVER_NETWORK** allows you to enable or disable distributed query processing over the network at the connection level.

Allowed Values
ON, OFF

Default
OFF

Scope
Requires the SET ANY PUBLIC OPTION system privilege to set this option for PUBLIC or for other user or role.

Can be set temporary for an individual or public.

Description
You can set the temporary database option **DQP_ENABLED_OVER_NETWORK** to ON to enable DQP over the network for the current connection. The OFF (default) setting has no effect, and the setting of the DQP_ENABLED logical server policy option determines whether or not DQP is used over the network for queries on the current connection.

LS Policy Option Setting	Database Option Setting	DQP Query Behavior
DQP_ENABLED 1	DQP_ENABLED_OVER_NETWORK ON	Queries on the current connection execute over network. Other queries use the shared temporary store.

LS Policy Option Setting	Database Option Setting	DQP Query Behavior
DQP_ENABLED 2	DQP_ENABLED_OVER_NETWORK ON	All queries execute over network
DQP_ENABLED 2	DQP_ENABLED OFF	All queries run in simplex mode.

Note: Any changes you make to a logical server policy option affect new connections only. Logical server policy options for existing connections are based on the time that the connection was initially established.

EARLY_PREDICATE_EXECUTION Option

Controls whether simple local predicates are executed before query optimization.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If this option is ON (the default), the optimizer finds, prepares, and executes predicates containing only local columns and constraints before query optimization, including join ordering, join algorithm selection, and grouping algorithm selection, so that the values of “Estimated Result Rows” in the query plan are more precise. If this option is OFF, the optimizer finds and prepares the simple predicates, but does not execute them before query optimization. The resulting values of “Estimated Result Rows” are less precise, if the predicates are not executed.

In general, `EARLY_PREDICATE_EXECUTION` should always be left ON, as this results in improved query plans for many queries.

Note that when EARLY_PREDICATE_EXECUTION is ON, SAP Sybase IQ executes the local predicates for all queries before generating a query plan, even when the NOEXEC option is ON. The generated query plan is the same as the runtime plan.

This information is included in the query plan for the root node:

- Threads used for executing local invariant predicates: if greater than 1, indicates parallel execution of local invariant predicates
- Early_Predicate_Execution: indicates if the option is OFF
- Time of Cursor Creation: the time of cursor creation

The simple predicates whose execution is controlled by this option are referred to as invariant predicates in the query plan. This information is included in the query plan for a leaf node, if there are any local invariant predicates on the node:

- Generated Post Invariant Predicate Rows: actual result after executing local invariant predicate
- Estimated Post Invariant Predicate Rows: calculated by using estimated local invariant predicates selectivity
- Time of Condition Start: starting time of the execution of local invariant predicates
- Time of Condition Done: ending time of the execution of local invariant predicates
- Elapsed Condition Time: elapsed time for executing local invariant predicates

ENABLE_ASYNC_IO Option

Allows a DBA to enable or disable the asynchronous IO used by the RLV persistence log.

Allowed Values
TRUE, FALSE

A change in value requires a database close and re-open, or a server restart.

Default
TRUE

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. If permitted, can be set for an arbitrary other user or role, or for all users via the role. Takes effect immediately.

ENABLE_LOB_VARIABLES Option

Controls the data type conversion of large object variables.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`ENABLE_LOB_VARIABLES` controls the data type conversion of large object variables.

When `ENABLE_LOB_VARIABLES` is OFF, large object variables less than 32K are implicitly converted; an error is reported if a large object variable is greater than or equal to 32K. A `LONG VARCHAR` variable is implicitly converted to a `VARCHAR` data type and truncated at 32K. A `LONG BINARY` variable is implicitly converted to a `VARBINARY` data type and truncated at 32K.

When `ENABLE_LOB_VARIABLES` is ON, large object variables of any size retain their original data type and size.

Example
Retain the data type and size of large object variables greater than 32K:

```
SET TEMPORARY OPTION ENABLE_LOB_VARIABLES = ON
```

EXTENDED_JOIN_SYNTAX Option

Controls whether queries with an ambiguous syntax for multi-table joins are allowed or are reported as an error.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option reports a syntax error for those queries containing outer joins that have ambiguous syntax due to the presence of duplicate correlation names on a null-supplying table.

This join clause illustrates the kind of query that is reported where C1 is a condition:

```
( R left outer join T , T  join S on ( C1 ) )
```

If `EXTENDED_JOIN_SYNTAX` is set to ON, this query is interpreted as follows, where C1 and C2 are conditions:

```
( R left outer join T on ( C1 ) ) join S on ( C2 )
```

FLOATING_POINT_ACCUMULATOR Option

Controls which accumulator to use for **SUM** or **AVG** of floating-point numbers.

Allowed Values
1, 2, 3

Default
2

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Setting 1 (fast accumulator) is faster and uses less space for floats and doubles than setting 2. This setting uses a single double precision variable to add double and float numbers, and is subject to the known accuracy limitations of such an approach.

Setting 2 (default) (medium accumulator) uses multiple double precision variables to accumulate floats and doubles. It is very accurate for addends in the range of magnitudes 1e-20 to 1e20. While it loses some accuracy outside of this range, it is still accurate enough for most applications. Setting 2 allows the optimizer to choose hash for faster performance more easily than setting 3.

Setting 3 (large accumulator) is highly accurate for all floats and doubles, but its size often precludes the use of hash optimization, which will be a performance limitation for most applications.

FORCE_DROP Option

Causes SAP Sybase IQ to leak, rather than reclaim, database disk space during a **DROP** command.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set as a temporary option only, for an individual connection or for the PUBLIC role, for the duration of the current connection.

Requires SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
You must drop a corrupt index, column or table and set the `FORCE_DROP` option to ON. This prevents the free list from being incorrectly updated from incorrect or suspect file space allocation information in the object being dropped. After dropping corrupt objects, you can reclaim the file space using the **-iqfrec** and **-iqdroplks** server switches.

When force dropping objects, you must ensure that only the `DBA` is connected to the database. The server must be restarted immediately after a force drop.

Do not attempt to force drop objects unless SAP Sybase Technical Support has instructed you to do so.

`FORCE_DROP` procedures for system recovery and database repair are described in *Administration: Backup, Restore, and Data Recovery*.

FORCE_NO_SCROLL_CURSORS Option

Forces all cursors to be non-scrolling.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
By default, all cursors are scrolling. Scrolling cursors with no host variable declared cause SAP Sybase IQ to create a buffer for temporary storage of results. Each row in the result set is stored to allow for backward scrolling.

Setting **FORCE_NO_SCROLL_CURSORS** to ON reduces temporary storage requirements. This option can be useful if you are retrieving very large numbers (millions) of rows. However if your front-end application makes frequent use of backward-scrolling cursor operations, query response will be faster with this option set to OFF.

If your front-end application rarely performs backward-scrolling, make `FORCE_NO_SCROLL_CURSORS = 'ON'` a permanent `PUBLIC` option, to use less memory and improve query performance.

FORCE_UPDATABLE_CURSORS Option

Controls whether cursors that have not been declared as updatable can be updated.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `FORCE_UPDATABLE_CURSORS` is ON, cursors which have not been declared as updatable can be updated. This option allows updatable cursors to be used in front-end applications without specifying the **FOR UPDATE** clause of the **DECLARE CURSOR** statement.

Sybase does not recommend the use of **FORCE_UPDATABLE_CURSORS** unless absolutely necessary.

FP_LOOKUP_SIZE Option

Specifies the number of lookup pages and cache memory allocated for Lookup **FP** indexes in SAP Sybase IQ 15. databases.

Allowed Values
1 MB – 4096 MB

Default
16 MB

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Dependencies
`FP_LOOKUP_SIZE` applies to databases running where `FP_NBIT_IQ15_COMPATIBILITY='ON'`. If `FP_NBIT_IQ15_COMPATIBILITY='OFF'`, the database engine ignores this option.

Description
If `FP_NBIT_IQ15_COMPATIBILITY='ON'`, `FP_LOOKUP_SIZE` controls the maximum number of lookup pages.

FP_LOOKUP_SIZE must be set public, so the allowed syntax is:

```
SET OPTION public.FP_LOOKUP_SIZE = 1
```

Important: The FP_NBIT_IQ15_COMPATIBILITY option provides tokenized **FP** support similar to that available in SAP Sybase IQ 15, not complete database compatibility. All SAP Sybase IQ 15 runtime behavior is available using the 16.0 interface. Avoid running a 16.0 database with FP_NBIT_IQ15_COMPATIBILITY='ON'.

See also

- *FP_LOOKUP_SIZE_PPM Option* on page 524
- *MINIMIZE_STORAGE Option* on page 573
- *FP_NBIT_IQ15_COMPATIBILITY Option* on page 527

FP_LOOKUP_SIZE_PPM Option

Controls the amount of main cache allocated to **FP** indexes in SAP Sybase IQ 15. databases.

Allowed Values
1 to 1000000

Default
2500

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Dependencies
FP_LOOKUP_SIZE_PPM applies to databases running where FP_NBIT_IQ15_COMPATIBILITY='ON'. If FP_NBIT_IQ15_COMPATIBILITY='OFF', SAP Sybase IQ ignores this option.

Description
If FP_NBIT_IQ15_COMPATIBILITY='ON', FP_LOOKUP_SIZE_PPM controls the maximum number of lookup pages and restricts this number to a parts-per-million value of main memory, that is, the value of FP_LOOKUP_SIZE_PPM * size of main memory / 1,000,000, where the size of main memory is specified by the **-iqmc** server startup parameter.

Important: The FP_NBIT_IQ15_COMPATIBILITY option provides tokenized **FP** support similar to that available in SAP Sybase IQ 15, not complete database compatibility. All SAP Sybase IQ 15 runtime behavior is available using the 16.0 interface. Avoid running a 16.0 database with FP_NBIT_IQ15_COMPATIBILITY='ON'.

See also

- *FP_LOOKUP_SIZE Option* on page 523
- *MINIMIZE_STORAGE Option* on page 573
- *FP_NBIT_IQ15_COMPATIBILITY Option* on page 527

FP_NBIT_AUTOSIZE_LIMIT Option

Limits the number of distinct values in columns that implicitly load as `NBit FP`.

Allowed Values
0 – 2,147,483,647

Default
1,048,576

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Dependencies
`FP_NBIT_AUTOSIZE_LIMIT` applies to databases running where `FP_NBIT_IQ15_COMPATIBILITY='OFF'`. If `FP_NBIT_IQ15_COMPATIBILITY='ON'`, the database engine ignores this option.

Description
`FP_NBIT_AUTOSIZE_LIMIT` limits the number of distinct values in all newly created columns without an explicit `IQ UNIQUE` setting. Columns constrained by the `FP_NBIT_AUTOSIZE_LIMIT` option load with a `Flat FP` or `NBit FP` index:

- If `FP_NBIT_AUTOSIZE_LIMIT` is greater than 0 and less than 2,147,483,647, columns load with an `NBit FP` index
- If `FP_NBIT_AUTOSIZE_LIMIT` equals 0, columns load with a `Flat FP` index

`FP_NBIT_AUTOSIZE_LIMIT` and `FP_NBIT_LOOKUP_MB` establish a ceiling for sizing `NBit` columns during data loads. As long as the number of distinct values is less than `FP_NBIT_AUTOSIZE_LIMIT` and the total dictionary size (values and counts) is less the `FP_NBIT_LOOKUP_MB`, the column loads as an `NBit`. If the load exceeds the `FP_NBIT_AUTOSIZE_LIMIT` but is less than `FP_NBIT_ROLLOVER_MAX_MB`, the column rolls over to `Flat FP`.

DML operations that exceed the FP_NBIT_ROLLOVER_MAX_MB and FP_ENFORCE_LIMITS='ON' rollback and report an error. If the FP_NBIT_ENFORCE_LIMITS='OFF', the column transitions to the next NBit level.

sp_iqindexmetadata returns details about Flat FP or NBit FP columns. **sp_iqrebuildindex** can change explicit or implicit NBit FP column limits, or reformat the default column index as Flat FP or NBit FP.

Additional Information

- *Reference: Building Blocks, Tables, and Procedures > System Procedures > Alphabetical List of System Stored Procedures > sp_iqrebuildindex*
- *Reference: Building Blocks, Tables, and Procedures > System Procedures » Alphabetical List of System Stored Procedures > sp_iqindexmetadata*

See also

- *FP_NBIT_ENFORCE_LIMITS Option* on page 526
- *FP_NBIT_IQ15_COMPATIBILITY Option* on page 527
- *FP_NBIT_LOOKUP_MB Option* on page 529
- *FP_NBIT_ROLLOVER_MAX_MB Option* on page 530

FP_NBIT_ENFORCE_LIMITS Option

Enforces sizing limits for explicit and implicit **NBit** columns.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Dependencies
FP_NBIT_ENFORCE_LIMITS applies to databases running where FP_NBIT_IQ15_COMPATIBILITY='OFF'. If FP_NBIT_IQ15_COMPATIBILITY='ON', the database engine ignores this option.

Description
DML operations check the FP_NBIT_ENFORCE_LIMITS option when the number of distinct values in a column exceeds the explicit limit set in an IQ UNIQUE constraint, which is above the FP_NBIT_AUTOSIZE value, or when the dictionary size for an implicit **NBit** rollover exceeds the FP_NBIT_ROLLOVER_MAX_MB limit.

- If FP_NBIT_ENFORCE_LIMITS='ON', the DML operation throws an error and rolls back
- If FP_NBIT_ENFORCE_LIMITS='OFF', the DML operation continues and the NBit dictionary limits are ignored

sp_iqindexmetadata returns details about Flat FP or NBit FP columns.
sp_iqrebuildindex can change explicit or implicit NBit FP column limits, or reformat the default column index as Flat FP or NBit FP.

Using **sp_iqrebuildindex** to increase the number of distinct values beyond current limits for a Flat FP column when FP_NBIT_ENFORCE_LIMITS='ON', returns an error. If FP_NBIT_ENFORCE_LIMITS='OFF', **sp_iqrebuildindex** rebuilds the index to the maximum token, which is the largest distinct value.

Additional Information

- *Reference: Building Blocks, Tables, and Procedures > System Procedures > Alphabetical List of System Stored Procedures > sp_iqrebuildindex*
- *Reference: Building Blocks, Tables, and Procedures > System Procedures » Alphabetical List of System Stored Procedures > sp_iqindexmetadata*

See also

- *FP_NBIT_AUTOSIZE_LIMIT Option* on page 525
- *FP_NBIT_IQ15_COMPATIBILITY Option* on page 527
- *FP_NBIT_LOOKUP_MB Option* on page 529
- *FP_NBIT_ROLLOVER_MAX_MB Option* on page 530

FP_NBIT_IQ15_COMPATIBILITY Option

Provides support for tokenized **FP** indexes similar to that available in SAP Sybase IQ 15.

Allowed Values
ON, OFF

Default
FP_NBIT_IQ15_COMPATIBILITY='OFF' in all new 16.0 databases.
FP_NBIT_IQ15_COMPATIBILITY='ON' in upgraded SAP Sybase IQ 15 databases.

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

The `FP_NBIT_IQ15_COMPATIBILITY` option provides tokenized `FP` support similar to that available in SAP Sybase IQ 15. All newly created and modified tokenized `FP` indexes in 16.0 will be `NBit`. The only 15 style `FP(1)`,`FP(2)`, and `FP(3)` byte `FP` indexes available in 16.0 are those from an upgraded database that have had only Read-Only activity.

The `FP_NBIT_IQ15_COMPATIBILITY` ON/OFF setting only pertains to tokenized `FP` creation and cut-off behavior:

If `FP_NBIT_IQ15_COMPATIBILITY='ON'`, the database engine:

- Enables the `MINIMIZE_STORAGE`, `FP_LOOKUP_SIZE`, `FP_LOOKUP_SIZE_PPM` options
- Creates DATE datatypes as `NBit FP`, even if `IQ UNIQUE(0)` is specified
- Rolls over to `Flat FP` at the 3 byte `FP` cutoff (16,777,216 distinct)
- Can tokenize data widths <= 255

If `FP_NBIT_IQ15_COMPATIBILITY='OFF'`:

- `MINIMIZE_STORAGE`, `FP_LOOKUP_SIZE`, `FP_LOOKUP_SIZE_PPM` options are ignored.
- DATE datatypes are not automatically `NBit`
- Data widths <=32767 may be tokenized
- `NBit FP` (tokenized) upper bound limit is `NBit` 31 (2,147,483,648 distinct values)
- `NBit` sizing options determine rollover behavior:
  - `IQ UNIQUE(0)` loads a column as `Flat FP`
  - Columns without `IQ UNIQUE` load as `NBit` up to the auto-size limits
  - Columns where `IQ UNIQUE(`*n*`)` is less than the auto-size limit load as `NBit`

Important: The `FP_NBIT_IQ15_COMPATIBILITY` option provides tokenized **FP** support similar to that available in SAP Sybase IQ 15, not complete database compatibility. All SAP Sybase IQ 15 runtime behavior is available using the 16.0 interface. Avoid running a 16.0 database with `FP_NBIT_IQ15_COMPATIBILITY='ON'`.

See also

- *FP_NBIT_AUTOSIZE_LIMIT Option* on page 525
- *FP_NBIT_ENFORCE_LIMITS Option* on page 526
- *FP_NBIT_LOOKUP_MB Option* on page 529
- *FP_NBIT_ROLLOVER_MAX_MB Option* on page 530
- *FP_LOOKUP_SIZE Option* on page 523
- *FP_LOOKUP_SIZE_PPM Option* on page 524
- *MINIMIZE_STORAGE Option* on page 573

FP_NBIT_LOOKUP_MB Option

Limits the total dictionary size for implicit `NBit FP` columns.

Allowed Values
1 – 4,294,967,295

Default
64MB

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Dependencies
`FP_NBIT_LOOKUP_MB` applies to databases running where `FP_NBIT_IQ15_COMPATIBILITY='OFF'`. If `FP_NBIT_IQ15_COMPATIBILITY='ON'`, the database engine ignores this option.

Description
`FP_NBIT_AUTOSIZE_LIMIT` and `FP_NBIT_LOOKUP_MB` establish a ceiling for sizing implicit `NBit` columns. As long as the number of distinct values is less than `FP_NBIT_AUTOSIZE_LIMIT` and the total dictionary size (values and counts) is less the `FP_NBIT_LOOKUP_MB`, the column loads with an `NBit FP` index. Limits are enforced by the `FP_NBIT_ENFORCE_LIMITS` option.

`DML` operations that exceed the `FP_NBIT_LOOKUP_MB` limit rollover to a `Flat FP` index.

If an operation exceeds FP_NBIT_LOOKUP_MB and FP_NBIT_ROLLOVER_MAX_MB limits and FP_NBIT_ENFORCE_LIMITS='OFF', the NBit FP transitions to the next NBit level.

sp_iqindexmetadata returns details about Flat FP or NBit FP columns.
sp_iqrebuildindex can change explicit or implicit NBit FP column limits, or reformat the default column index as Flat FP or NBit FP.

Additional Information

- *Reference: Building Blocks, Tables, and Procedures > System Procedures > Alphabetical List of System Stored Procedures > sp_iqrebuildindex*
- *Reference: Building Blocks, Tables, and Procedures > System Procedures » Alphabetical List of System Stored Procedures > sp_iqindexmetadata*

See also

- *FP_NBIT_AUTOSIZE_LIMIT Option* on page 525
- *FP_NBIT_ENFORCE_LIMITS Option* on page 526
- *FP_NBIT_IQ15_COMPATIBILITY Option* on page 527
- *FP_NBIT_ROLLOVER_MAX_MB Option* on page 530

FP_NBIT_ROLLOVER_MAX_MB Option

Sets a threshold for the total dictionary size for implicit NBit rollovers to Flat FP.

Allowed Values
1 – 4,294,967,295

Default
16384

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Dependencies
FP_NBIT_ROLLOVER_MAX_MB applies to databases running where FP_NBIT_IQ15_COMPATIBILITY='OFF'. If FP_NBIT_IQ15_COMPATIBILITY='ON', the database engine ignores this option.

Description

`FP_NBIT_AUTOSIZE_LIMIT` and `FP_NBIT_LOOKUP_MB` establish a ceiling for sizing implicit `NBit FP` columns. DML operations that exceed these values check the `FP_NBIT_ROLLOVER_MAX_MB` limit, which sets the dictionary size (values and counts) for implicit `NBit` rollovers:

- If the total dictionary size does not exceed the `FP_NBIT_ROLLOVER_MAX_MB`, the `NBit` column rolls over to a `Flat FP`.
- If the dictionary size exceeds the `FP_NBIT_ROLLOVER_MAX_MB` limit and `FP_NBIT_ENFORCE_LIMITS='ON'`, DML operations throw an error and roll back.
- If the dictionary size exceeds the `FP_NBIT_ROLLOVER_MAX_MB` limit and `FP_NBIT_ENFORCE_LIMITS='OFF'` (default), DML operations throw an error, and the `NBit` dictionary continues to grow.
- If `FP_NBIT_ROLLOVER_MAX_MB='0'`, the `NBit` column rolls over to `Flat FP`.

sp_iqindexmetadata returns details about `Flat FP` or `NBit FP` columns.
sp_iqrebuildindex can change explicit or implicit `NBit FP` column limits, or reformat the default column index as `Flat FP` or `NBit FP`.

Additional Information

- *Reference: Building Blocks, Tables, and Procedures > System Procedures > Alphabetical List of System Stored Procedures > sp_iqrebuildindex*
- *Reference: Building Blocks, Tables, and Procedures > System Procedures » Alphabetical List of System Stored Procedures > sp_iqindexmetadata*

FP_PREDICATE_WORKUNIT_PAGES Option

Specifies degree of parallelism used in the default index.

Allowed Values
Integer

Default
200

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The default index calculates some predicates such as SUM, RANGE, MIN, MAX and COUNT DISTINCT in parallel. `FP_PREDICATE_WORKUNIT_PAGES` affects the degree of parallelism used by specifying the number of pages worked on by each thread. To increase the degree of parallelism, decrease the value of this option.

FPL_EXPRESSION_MEMORY_KB Option

Controls the use of memory for the optimization of queries involving functional expressions against columns having enumerated storage.

Allowed Values
0 – 20000

Default
1024 kilobytes

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`FPL_EXPRESSION_MEMORY_KB` controls the use of memory for the optimization of queries involving functional expressions against columns having enumerated storage. The option enables the DBA to constrain the memory used by this optimization and balance it with other SAP Sybase IQ memory requirements, such as caches. Setting this option to 0 switches off optimization.

GARRAY_FILL_FACTOR_PERCENT Option

Specifies the percent of space on each **HG** garray page to reserve for future incremental inserts into existing groups.

Allowed Values
0 – 1000

Default
25

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The garray tries to pad out each group to include a pad of empty space set by the value. This space is used for rows added to existing index groups.

An **HG** index can reserve some storage on a per-group basis (where group is defined as a group of rows with equivalent values). Reserving space consumes additional disk space, but can help the performance of incremental inserts into the **HG** index.

If you plan to do future incremental inserts into an **HG** index, and those new rows have values that are already present in the index, a nonzero value for this option might improve incremental insert performance.

If you do not plan to incrementally update the index, you can reduce the values of this option to save disk space.

See also
- *GARRAY_PAGE_SPLIT_PAD_PERCENT Option* on page 534

GARRAY_INSERT_PREFETCH_SIZE Option

Specifies number of pages used for prefetch.

Allowed Values
0 – 100

Default
3

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option defines the number of database pages read ahead during an insert to a column that has an **HG** index.

Do not set this option unless advised to do so by Sybase Technical Support.

See also
- *GARRAY_FILL_FACTOR_PERCENT Option* on page 532

GARRAY_PAGE_SPLIT_PAD_PERCENT Option

Determines per-page fill factor during page splits on the garray and specifies the percent of space on each **HG** garray page to reserve for future incremental inserts.

Allowed Values
0 – 100

Default
25

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Splits of a garray page try to leave that percentage empty. This space is used for rows added to new index groups.

An **HG** index can reserve storage at the page level that can be allocated to new groups when additional rows are inserted. Reserving space consumes additional disk space, but can help the performance of incremental inserts into the **HG** index.

If future plans include incremental inserts into an **HG** index, and the new rows do not have values that are already present in the index, a nonzero value for `GARRAY_PAGE_SPLIT_PAD_PERCENT` could improve incremental insert performance.

If you do not plan to incrementally update the index, you can reduce the values of this option to save disk space.

See also

- *GARRAY_FILL_FACTOR_PERCENT Option* on page 532

GARRAY_RO_PREFETCH_SIZE Option

Specifies number of pages used for prefetch.

Allowed Values
0 – 100

Default
10

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option defines the number of database pages read ahead during a query to a column that has an **HG** index.

Do not set this option unless advised to do so by Sybase Technical Support.

HASH_PINNABLE_CACHE_PERCENT Option

Controls the maximum percentage of a user's temp memory that a hash object can pin.

Allowed Values
0 – 100

Default
20

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

HASH_PINNABLE_CACHE_PERCENT controls the percentage of a user's temp memory allocation that any one hash object can pin in memory. The default is 20%, but you should reduce this number to 10% if you are running complex queries, or increase this number to 50% if you have simple queries that need a single large hash object to run, such as a large **IN** subquery.

HASH_PINNABLE_CACHE_PERCENT is for use by primarily Sybase Technical Support. If you change the value of it, do so with extreme caution; first analyze the effect on a wide variety of queries.

See also

- *BIT_VECTOR_PINNABLE_CACHE_PERCENT Option* on page 479
- *SORT_PINNABLE_CACHE_PERCENT Option* on page 617

HASH_THRASHING_PERCENT Option

Specifies the percent of hard disk I/Os allowed during the execution of a statement that includes a query involving hash algorithms, before the statement is rolled back and an error message is reported.

Allowed Values

0 – 100

Default

10

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

If a query that uses hash algorithms causes an excessive number of hard disk I/Os (paging buffers from memory to disk), query performance is negatively affected, and server performance might also be affected. HASH_THRASHING_PERCENT controls the percentage of hard disk I/Os allowed before the statement is rolled back and an error message

is returned. The text of the error message is either `Hash insert thrashing detected` or `Hash find thrashing detected`.

The default value of `HASH_THRASHING_PERCENT` is 10%. Increasing this value permits more paging to disk before a rollback and decreasing this value permits less paging before a rollback.

See also

- *HASH_PINNABLE_CACHE_PERCENT Option* on page 535

HG_DELETE_METHOD Option

Specifies the algorithm used during a delete in a **HG** index.

Allowed Values
0 – 3

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option chooses the algorithm used by the **HG** index during a delete operation. The cost model considers the CPU related costs as well as I/O related costs in selecting the appropriate delete algorithm. The cost model takes into account:

- Rows deleted
- Index size
- Width of index data type
- Cardinality of index data
- Available temporary cache
- Machine related I/O and CPU characteristics
- Available CPUs and threads
- Referential integrity costs

To force a “small” method, set this option to 1. To force the “large” method, set the option to 2. To force a “midsize” method, set the option to 3.

HG_SEARCH_RANGE Option

Specifies the maximum number of Btree pages used in evaluating a range predicate in the **HG** index.

Allowed Values
Integer

Default
10

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The default setting of this option is appropriate for most queries.

This option effectively controls the amount of time the optimizer spends searching for the best index to use for a range predicate. Setting this option higher may cause a query to spend more time in the optimizer, but as a result may choose a better index to resolve a range predicate.

HTTP_SESSION_TIMEOUT Option

Specifies the amount of time, in minutes, that the client waits for an HTTP session to time out before giving up.

Allowed Values
Integer (0 – 525600)

Default
30

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Takes effect immediately.

Description
This option provides variable session timeout control for Web service applications. A Web service application can change the timeout value from within any request that owns the HTTP session, but a change to the timeout value can impact subsequent queued requests if the HTTP session times out. The Web application must include logic to detect whether a client is attempting to access an HTTP session that no longer exists. This can be done by examining the value of the **SessionCreateTime** connection property to determine whether a timestamp is valid: if the HTTP request is not associated with the current HTTP session, the **SessionCreateTime** connection property contains an empty string.

IDENTITY_ENFORCE_UNIQUENESS Option

Creates a unique **HG** index on each IDENTITY/AUTOINCREMENT column, if the column is not already a primary key.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When option is set ON, **HG** indexes are created on future identity columns. The index can only be deleted if the deleting user is the only one using the table and the table is not a local temporary table.

See also

- *QUERY_PLAN Option* on page 596

IDENTITY_INSERT Option

Enables users to insert values into or to update an IDENTITY or AUTOINCREMENT column.

Allowed Values

= '*tablename*'

Default

Option not set.

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Note: If you set a user level option for the current option, the corresponding temporary option is also set. See *Scope and Duration of Database Options*.

Description

When `IDENTITY_INSERT` is set, insert/update is enabled. A table name must be specified to identify the column to insert or update. If you are not the table owner, qualify the table name with the owner name.

To drop a table with an IDENTITY column, `IDENTITY_INSERT` must not be set to that table.

Examples

If you use the table `Employees` to run explicit inserts:

```
SET TEMPORARY OPTION IDENTITY_INSERT = 'Employees'
```

To turn the option off, specify the equals sign and an empty string:

```
SET TEMPORARY OPTION IDENTITY_INSERT = ''
```

Illustrates the effect of user level options on temporary options (see *Note*), if you are connected to the database as DBA and enter:

```
SET OPTION IDENTITY_INSERT = 'Customers'
```

The value for the option is set to `Customers` for the user DBA and temporary for the current connection. Other users who subsequently connect to the database as DBA find their option value for `IDENTITY_INSERT` is `Customers` also.

See also

- *Scope and Duration of Database Options* on page 455
- *QUERY_PLAN Option* on page 596

IN_SUBQUERY_PREFERENCE Option

Controls the choice of algorithms for processing an **IN** subquery.

Allowed Values
-3 to 3

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The IQ optimizer has a choice of several algorithms for processing **IN** subqueries. This option allows you to override the optimizer's costing decision when choosing the algorithm to use. It does not override internal rules that determine whether an algorithm is legal within the query engine.

`IN_SUBQUERY_PREFERENCE` is normally used for internal testing and for manually tuning queries that the optimizer does not handle well. Only experienced DBAs should use it. The only reason to use this option is if the optimizer seriously underestimates the number of rows produced by a subquery, and the hash object is thrashing. Before setting this option, try to improve the mistaken estimate by looking for missing indexes and dependent predicates.

Inform Sybase Technical Support if you need to set `IN_SUBQUERY_PREFERENCE`, as setting this option might mean that a change to the optimizer is appropriate.

Table 22. IN_SUBQUERY_PREFERENCE Valid Values

Value	Action
0	Let the optimizer choose
1	Prefer sort-based **IN** subquery
2	Prefer vertical **IN** subquery (where a subquery is a child of a leaf node in the query plan)
3	Prefer hash-based **IN** subquery
-1	Avoid sort-based **IN** subquery
-2	Avoid vertical **IN** subquery
-3	Avoid hash-based **IN** subquery

INDEX_ADVISOR Option

Generates messages suggesting additional column indexes that may improve performance of one or more queries.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When set ON, the index advisor prints index recommendations as part of the query plan or as a separate message in the message log file, if query plans are not enabled. These messages begin with the string "`Index Advisor:`" and you can use that string to search and filter them from a message file. The output is in `OWNER.TABLE.COLUMN` format.

Set both **INDEX_ADVISOR** and **INDEX_ADVISOR_MAX_ROWS** to accumulate index advice.

Note: When **INDEX_ADVISOR_MAX_ROWS** is set ON, index advice will not be written to the message file as separate messages. Advice will, however, continue to be displayed on query plans in the message file.

Table 23. Index Advisor

Situation	Recommendation
Local predicates on a single column where an **HG**, **LF**, **HNG**, `DATE`, `TIME` or `DATETIME` index would be desirable, as appropriate.	Recommend adding an <index-type> index to column <col>
Single column join keys where an **LF** or **HG** index would be useful.	Add an **LF** or **HG** index to join key <col>
Single column candidate key indexes where a **HG** exists, but could be changed to a unique **HG** or **LF**	Change join key <col> to a unique **LF** or **HG** index
Join keys have mismatched data types, and regenerating one column with a matched data type would be beneficial.	Make join keys <col1> and <col2> identical data types
Subquery predicate columns where an **LF** or **HG** index would be useful.	Add an **LF** or **HG** index to subquery column <col>
Grouping columns where an **LF** or **HG** index would be useful.	Create an **LF** or **HG** index on grouping column <col>
Single-table intercolumn comparisons where the two columns are identical data types, a **CMP** index are recommended.	Create a **CMP** index on <col1>, <col2>
) Columns where an **LF** or **HG** index exists, and the number of distinct values allows, suggest converting the **FP** to a 1 or 2-byte **FP** index.	Rebuild <col> with ‘optimize storage=on’
To support the lookup of default indexes three bytes wide	Rebuild your FP Index as a 3-byte FP with an IQ UNIQUE constraint value of 65537

It is up to you to decide how many queries benefit from the additional index and whether it is worth the expense to create and maintain the indexes. In some cases, you cannot determine how much, if any, performance improvement results from adding the recommended index.

For example, consider columns used as a join key. SAP Sybase IQ uses metadata provided by **HG** or **LF** indexes extensively to generate better/faster query plans to execute the query. Putting an **HG** or **LF** index on a join column without one makes the IQ optimizer far more likely to choose a faster join plan, but without adding the index and running the query again, it is very hard to determine whether query performance stays the same or improves with the new index.

Example

Index advisor output with query plan set OFF:

```
I. 03/30 14:18:45. 0000000002 Advice: Add HG or LF index
on DBA.ta.c1 Predicate: (ta2.c1 < BV(1))
```

Index advisor output with query plan set ON:

Note: This method accumulates index advisor information for multiple queries, so that advice for several queries can be tracked over time in a central location.

```
I. 03/30 14:53:24. 0000000008 [20535]: 6    ...#03: Leaf
I. 03/30 14:53:24. 0000000008 [20535]:         Table Name: tb
I. 03/30 14:53:24. 0000000008 [20535]:         Condition 1
(Invariant):
(tb.c3 =tb.c4)
I. 03/30 14:53:24. 0000000008 [20535]:         Condition 1 Index
Advisor:
Add a CMP index on DBA.tb (c3,c4)
```

See also

- *FP_LOOKUP_SIZE Option* on page 523
- *INDEX_ADVISOR_MAX_ROWS Option* on page 544
- *QUERY_PLAN Option* on page 596

INDEX_ADVISOR_MAX_ROWS Option

Sets the maximum number of unique advice messages stored by the index advisor to max_rows.

Allowed Values

Value	Description
0	Minimum value disables collection of index advice
4294967295	Maximum value allowed

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

INDEX_ADVISOR_MAX_ROWS limits the number of messages stored by the index advisor. Once the specified limit has been reached, the **INDEX_ADVISOR** will not store new advice. It will, however, continue to update counts and timestamps for existing advice messages.

```
SET OPTION public.Index_Advisor_Max_Rows = max_rows;
```

See also

- *FP_LOOKUP_SIZE Option* on page 523
- *INDEX_ADVISOR Option* on page 542

INDEX_PREFERENCE Option

Controls the choice of indexes to use for queries.

Allowed Values

Value	Action
0	Let the optimizer choose
1	Prefer **LF** indexes
2	Prefer **HG** indexes
3	Prefer **HNG** indexes
4	Prefer **CMP** indexes
5	Prefer the default index
6	Prefer **WD** indexes
8	Prefer **DATE** indexes
9	Prefer **TIME** indexes
10	Prefer **DTTM** indexes
-1	Avoid **LF** indexes
-2	Avoid **HG** indexes
-3	Avoid **HNG** indexes
-4	Avoid **CMP** indexes
-5	Avoid the default index
-6	Avoid **WD** indexes

Value	Action
-8	Avoid **DATE** indexes
-9	Avoid **TIME** indexes
-10	Avoid **DTTM** indexes

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The SAP Sybase IQ optimizer normally chooses the best index available to process local **WHERE** clause predicates and other operations that can be done within an IQ index. `INDEX_PREFERENCE` is used to override the optimizer choice for testing purposes; under most circumstances, it should not be changed.

INFER_SUBQUERY_PREDICATES Option

Controls the optimizer's inference of additional subquery predicates.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`INFER_SUBQUERY_PREDICATES` controls whether the optimizer is allowed to infer additional subquery predicates from an existing subquery predicate through transitive closure across a simple equality join predicate. In most cases in which the optimizer chooses to make this inference, the query runs faster. There are some exceptions to this performance improvement, so you may need to experiment to be sure that this option is appropriate for your environment.

IQGOVERN_MAX_PRIORITY Option

Limits the allowed `IQGOVERN_PRIORITY` setting.

Allowed Values
1 – 3

Default
2

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Limits the allowed `IQGOVERN_PRIORITY` setting, which affects the order in which a user's queries are queued for execution. In the range of allowed values, 1 indicates high priority, 2 (the default) medium priority, and 3 low priority. SAP Sybase IQ returns an error if a user sets `IQGOVERN_PRIORITY` higher than `IQGOVERN_MAX_PRIORITY`.

See also
- *IQGOVERN_PRIORITY Option* on page 547
- *IQGOVERN_PRIORITY_TIME Option* on page 548

IQGOVERN_PRIORITY Option

Assigns a priority to each query waiting in the **-iqgovern** queue.

Allowed Values
1 – 3

Default
2

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Assigns a value that determines the order in which a user's queries are queued for execution. In the range of allowed values, 1 indicates high priority, 2 (the default) medium priority, and 3 low priority. This switch can be set temporary per user or public by any user. Queries with a lower priority will not run until all higher priority queries have executed.

This option is limited by the per user or per group value of the option `IQGOVERN_MAX_PRIORITY`.

See also
- *IQGOVERN_MAX_PRIORITY Option* on page 547
- *IQGOVERN_PRIORITY_TIME Option* on page 548

IQGOVERN_PRIORITY_TIME Option

Limits the time a high priority query waits in the queue before starting.

Allowed Values
0 – 1,000,000 seconds. Must be lower than `IQGOVERN_MAX_PRIORITY`.

Default
0 (disabled)

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
Limits the time a high priority (priority 1) query waits in the queue before starting. When the limit is reached, the query is started even if it exceeds the number of queries allowed by the

-iqgovern setting. The range is from 1 to 1,000,000 seconds. The default (0) disables this feature. IQGOVERN_PRIORITY_TIME must be set PUBLIC.

See also

- *IQGOVERN_MAX_PRIORITY Option* on page 547
- *IQGOVERN_PRIORITY Option* on page 547

ISOLATION_LEVEL Option

Controls the locking isolation level for catalog store tables.

Allowed Values

- 0 – Allow dirty reads, nonrepeatable reads, and phantom rows.
- 1 – Prevent dirty reads. Allow nonrepeatable reads and phantom rows.
- 2 – Prevent dirty reads and guarantee repeatable reads. Allow phantom rows.
- 3 – Serializable. Do not allow dirty reads, guarantee repeatable reads, and do not allow phantom rows.

Default
0

1 for Open Client and JDBC connections

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
ISOLATION_LEVEL determines the isolation level for tables in the catalog store. SAP Sybase IQ always enforces level 3 for tables in the IQ store. Level 3 is equivalent to ANSI level 4.

JAVA_LOCATION Option

Specifies the path of the Java VM for the database.

Allowed Values
String

Default
Empty string

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
By default, this option contains an empty string. In this case, the database server searches the `JAVA_HOME` environment variable, the path, and other locations for the Java VM.

See also
- *JAVA_VM_OPTIONS Option* on page 550

JAVA_VM_OPTIONS Option

Specifies command line options that the database server uses when it launches the Java VM.

Allowed Values
String

Default
Empty string

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
`JAVA_VM_OPTIONS` specifies options that the database server uses when launching the Java VM specified by the `JAVA_LOCATION` option. These additional options can be used to set up the Java VM for debugging purposes or to run as a service on UNIX platforms. In some cases, additional options are required to use the Java VM in 64-bit mode instead of 32-bit mode.

See also
- *JAVA_LOCATION Option* on page 549

JOIN_EXPANSION_FACTOR Option

Controls how conservative the optimizer's join result estimates are in unusually complex situations.

Allowed Values
1 – 100

Default
30

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option controls how conservative the join optimizer's result size estimates are in situations where an input to a specific join has already passed through at least one intermediate join that can result in multiple copies of rows projected from the table being joined.

A level of zero indicates that the optimizer should use the same estimation method above intermediate expanding joins as it would if there were no intermediate expanding joins.

This results in the most aggressive (small) join result size estimates.

A level of 100 indicates that the optimizer should be much more conservative in its estimates whenever there are intermediate expanding joins, and this results in the most conservative (large) join result size estimates.

Normally, you should not need to change this value. If you do, set `JOIN_EXPANSION_FACTOR` as a temporary or user option.

JOIN_OPTIMIZATION Option

Enables or disables the optimization of the join order.

Allowed Values
ON, OFF

Default
ON

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

When JOIN_OPTIMIZATION is ON, SAP Sybase IQ optimizes the join order to reduce the size of intermediate results and sorts, and to balance the system load. When the option is OFF, the join order is determined by the order of the tables in the **FROM** clause of the **SELECT** statement.

JOIN_OPTIMIZATION should always be set ON.

JOIN_OPTIMIZATION controls the order of the joins, but not the order of the tables. To show the distinction, consider this example **FROM** clause with four tables:

```
FROM  A, B, C, D
```

By default, this **FROM** clause creates a left deep plan of joins that could also be explicitly represented as:

```
FROM  (((A, B), C), D)
```

If JOIN_OPTIMIZATION is turned OFF, then the order of these joins on the sets of tables is kept precisely as specified in the **FROM** clause. Thus A and B must be joined first, then that result must be joined to table C, and then finally joined to table D. This option does not control the left/right orientation at each join. Even with JOIN_OPTIMIZATION turned OFF, the optimizer, when given the above **FROM** clause, can produce a join plan that looks like:

```
FROM  ((C, (A, B)), D)
```

or

```
FROM  (((B, A), C), D)
```

or

```
FROM  (D, ((A, B), C))
```

In all of these cases, A and B are joined first, then that result is joined to C, and finally that result is joined to table D. The order of the joins remains the same, but the order of the tables appears different.

In general, if JOIN_OPTIMIZATION is turned OFF, you probably should use parentheses in the **FROM** clause, as in the above examples, to make sure that you get the join order you want.

If you want to join A and B to the join of C and D, you can specify this join by using parentheses:

```
FROM ((A, B), (C, D))
```

Note that the above **FROM** clause is a different join order than the original example **FROM** clause, even though all the tables appear in the same order.

JOIN_OPTIMIZATION should be set to OFF only to diagnose obscure join performance issues or to manually optimize a small number of predefined queries. With JOIN_OPTIMIZATION turned OFF, queries can join up to 128 tables, but might also suffer serious performance degradation.

Warning! If you turn off JOIN_OPTIMIZATION, SAP Sybase IQ has no way to ensure optimal performance for queries containing joins. You assume full responsibility for performance aspects of your queries.

JOIN_PREFERENCE Option

Controls the choice of algorithms when processing joins.

Allowed Values

Value	Action
0	Let the optimizer choose
1	Prefer sort-merge
2	Prefer nested-loop
3	Prefer nested-loop push-down
4	Prefer hash
5	Prefer hash push-down
6	Prefer asymmetric sort-merge join
7	Prefer sort-merge push-down
8	Prefer asymmetric sort-merge push-down join
9	Prefer partitioned hash join if the join keys include all the partition keys of a hash partitioned table
10	Prefer partitioned hash-push down join if the join keys include all the partition keys of a hash partitioned table
11	Prefer partitioned sort-merge join if the join keys include all the partition keys of a hash partitioned table

Value	Action
12	Prefer partitioned sort-merge push-down join if the join keys include all the partition keys of a hash partitioned table
-1	Avoid sort-merge
-2	Avoid nested-loop
-3	Avoid nested-loop push-down
-4	Avoid hash
-5	Avoid hash push-down
-6	Avoid asymmetric sort-merge join
-7	Avoid sort-merge push-down
-8	Avoid asymmetric sort-merge push-down join
-9	Avoid partitioned hash join if the join keys include all the partition keys of a hash partitioned table
-10	Avoid partitioned hash-push down join if the join keys include all the partition keys of a hash partitioned table
-11	Avoid partitioned sort-merge join if the join keys include all the partition keys of a hash partitioned table
-12	Avoid partitioned sort-merge push-down join if the join keys include all the partition keys of a hash partitioned table

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
For joins within a query, the SAP Sybase IQ optimizer has a choice of several algorithms for processing the join. `JOIN_PREFERENCE` allows you to override the optimizer's cost-based

decision when choosing the algorithm to use. It does not override internal rules that determine whether an algorithm is legal within the query engine. If you set it to any nonzero value, every join in a query is affected; you cannot use it to selectively modify one join out of several in a query, but join condition hint strings can do so.

This option is normally used for internal testing or tuning of report queries, and only experienced DBAs should use it.

Simple equality join predicates can be tagged with a predicate hint that allows a join preference to be specified for just that one join. If the same join has more than one join condition with a local join preference, and if those hints are not the same value, then all local preferences are ignored for that join. Local join preferences do not affect the join order chosen by the optimizer.

This example requests a hash join:

```
AND (T.X = 10 * R.x, 'J:4')
```

JOIN_SIMPLIFICATION_THRESHOLD Option

Controls the minimum number of tables being joined together before any join optimizer simplifications are applied.

Allowed Values
1 – 64

Default
12

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The query optimizer simplifies its optimization of join order by separate handling of both lookup tables (that is, nonselective dimension tables) and tables that are effective Cartesian products. After simplification, it optimizes the remaining tables for join order, up to the limit set by `MAX_JOIN_ENUMERATION`.

Setting this option to a value greater than the current value for `MAX_JOIN_ENUMERATION` has no effect.

Setting this value below the value for MAX_JOIN_ENUMERATION might improve the time required to optimize queries containing many joins, but may also prevent the optimizer from finding the best possible join plan.

If you change this value, set the JOIN_SIMPLIFICATION_THRESHOLD as a temporary or user option, and to a value of at least 9.

See also

- *MAX_JOIN_ENUMERATION Option* on page 567

LF_BITMAP_CACHE_KB Option

Specifies the amount of memory to use for a load into a **LF** index.

Allowed Values
1 – 8

Default
4

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
LF_BITMAP_CACHE_KB defines the amount of heap memory (in KB) per distinct value used during a load into an **LF** index. The default allots 4KB. If the sum of the distinct counts for all **LF** indexes on a particular table is relatively high (greater than 10,000), then heap memory use might increase to the point of impacting load performance due to system page faulting. If this is the case, reduce the value of LF_BITMAP_CACHE_KB.

This formula shows how to calculate the heap memory used (in bytes) by a particular **LF** index during a load:

```
Heap-memory-used = (lf_bitmap_cache_kb * 1024)
* lf-distinct-count-for-column
```

Using the default of 4KB, an **LF** index with 1000 distinct values can use up to 4MB of heap memory during a load.

LOAD_ZEROLENGTH_ASNULL Option

Specifies LOAD statement behavior under certain conditions.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option specifies LOAD statement behavior under these conditions:

- inserting a zero-length data value into a column of data type CHAR, VARCHAR, LONG VARCHAR, BINARY, VARBINARY, or LONG BINARY
  and
- a NULL column-spec; for example, NULL(ZEROS) or NULL(BLANKS) is also given for that same column

Set LOAD_ZEROLENGTH_ASNULL ON to load a zero-length value as NULL when the above conditions are met.

Set LOAD_ZEROLENGTH_ASNULL OFF to load a zero-length value as zero-length, subject to the setting of option NON_ANSI_NULL_VARCHAR.

See also
- *NON_ANSI_NULL_ VARCHAR Option* on page 582
- *LOAD TABLE Statement* on page 335

LOG_CONNECT Option

Controls logging of user connections.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Takes effect immediately.

Description
When this option is ON, a message appears in the IQ message log (`.iqmsg` file) every time a user connects to or disconnects from the SAP Sybase IQ database.

Note: If this option is set OFF (connection logging disabled) when a user connects, and then turned on before the user disconnects, the message log shows that user disconnecting but not connecting.

LOG_CURSOR_OPERATIONS Option

Controls logging of cursor operations.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When this option is ON, a message appears in the IQ message log every time you open or close a cursor. Normally this option should be OFF, which is the default. Turn it ON only if you are having a problem and must provide debugging data to Sybase Technical Support.

LOG_DEADLOCKS Option

Controls whether deadlock reporting is turned on or off.

Allowed values
On, Off

Default
Off

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Remarks
When this option is set to On, the database server logs information about deadlocks in an internal buffer. The size of the buffer is fixed at 10000 bytes. You can view the deadlock information using the sa_report_deadlocks stored procedure. The contents of the buffer are retained when this option is set to Off.

When deadlock occurs, information is reported for only those connections involved in the deadlock. The order in which connections are reported is based on which connection is waiting for which row. For thread deadlocks, information is reported about all connections.

When you have deadlock reporting turned on, you can also use the Deadlock system event to take action when a deadlock occurs

LOGIN_MODE Option

Controls the use of integrated logins for the database.

Allowed Values

- Standard – the default setting, which does not permit integrated logins. An error occurs if an integrated login connection is attempted.
- Mixed – both integrated logins and standard logins are allowed.
- Integrated – all logins to the database must be made using integrated logins.
- Kerberos – all logins to the database must be made using Kerberos logins.
- LDPAUA – all logins to the database must be made using LDAP logins.

Note: Mixed is equivalent to "Standard,Integrated".

Default
Standard

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Takes effect immediately.

Description
Values are case-insensitive:

Warning!

- Restricting the `LOGIN_MODE` to a single mode in a mixed environment (for example, Integrated only or LDAPUA only) restricts connections to only those users who have been granted the corresponding login mapping. Attempting to connect using other methods generates an error. The only exceptions to this are users with full administrative rights (SYS_AUTH_DBA_ROLE or SYS_AUTH_SSO_ROLE).
- Restricting the `LOGIN_MODE` to LDAPUA only may result in a configuration where no users can connect to the server if no user or login policy exists that permits LDAPUA. Use the command line switch **-al***user-id-list* with the **start_iq** utility to recover from this situation.

LOGIN_PROCEDURE Option

Specifies a login procedure that sets connection compatibility options at start-up.

Allowed Values
String

Default
sp_login_environment system procedure

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The initial connection compatibility options settings are controlled using the `LOGIN_PROCEDURE` option, which is called after all the checks have been performed to verify that the connection is valid. The `LOGIN_PROCEDURE` option names a stored

procedure to run when users connect. The default setting is to use the **sp_login_environment** system stored procedure. You can specify a different stored procedure. The procedure specified by the LOGIN_PROCEDURE option is not executed for event connections.

The **sp_login_environment** procedure checks to see if the connection is being made over TDS. If the connection is made over TDS, **sp_login_environment** calls the **sp_tsql_environment** procedure, which sets several options to new default values for the current connection.

See also

- *Initial Option Settings* on page 458

MAIN_RESERVED_DBSPACE_MB Option

Controls the amount of space SAP Sybase IQ reserves in the IQ main store.

Allowed Values
Integer greater than or equal to 200, in megabytes

Default
200; SAP Sybase IQ actually reserves a maximum of 50% and a minimum of 1% of the last read-write file in IQ_SYSTEM_MAIN

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
MAIN_RESERVED_DBSPACE_MB controls the amount of space SAP Sybase IQ sets aside in the IQ main store for certain small but critical data structures used during release savepoint, commit, and checkpoint operations. For a production database, set this value between 200MB and 1GB, or at least 20 percent of IQ_SYSTEM_MAIN size. The larger your IQ page size and number of concurrent connections, the more reserved space you need.

Reserved space size is calculated as a maximum of 50 percent and a minimum of 1 percent of the last read-write file in IQ_SYSTEM_MAIN.

SAP Sybase IQ ignores the MAIN_RESERVED_DBSPACE_MB option if the actual dbspace size is less than twice the size of the MAIN_RESERVED_DBSPACE_MB value. In dbspaces less than 100MB (such as the demo database), half the usable space may be reserved.

MAX_CARTESIAN_RESULT Option

Limits the number of rows resulting from a Cartesian join.

Allowed Values
Any integer

Default
100000000

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`MAX_CARTESIAN_RESULT` limits the number of result rows from a query containing a Cartesian join (usually the result of missing one or more join conditions when creating the query). If SAP Sybase IQ cannot find a query plan for the Cartesian join with an estimated result under this limit, it rejects the query and returns an error. Setting `MAX_CARTESIAN_RESULT` to 0 disables the check for the number of result rows of a Cartesian join.

MAX_CLIENT_NUMERIC_PRECISION Option

Controls the maximum precision for numeric data sent to the client.

Allowed Values
0 – 126

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When SAP Sybase IQ performs its calculation, it promotes data types to an appropriate size that ensures accuracy. The promoted data type might be larger in size than Open Client and some ODBC applications can handle correctly.

When `MAX_CLIENT_NUMERIC_PRECISION` is a nonzero value, SAP Sybase IQ checks that numeric result columns do not exceed this value. If the result column is bigger than `MAX_CLIENT_NUMERIC_PRECISION` allows, and SAP Sybase IQ cannot cast it to the specified precision, the query returns this error:

```
Data Exception - data type conversion is not possible %1
SQLCODE = -1001006
```

Note: In SQL Anywhere, the maximum value supported for the numeric function is 255. If the precision of the numeric function exceeds the maximum value supported, you see the error: `The result datatype for function '_funcname' exceeds the maximum supported numeric precision of 255. Please set the proper value for precision in numeric function, 'location'`

See also

- *MAX_CLIENT_NUMERIC_SCALE Option* on page 563
- *PRECISION Option* on page 590

MAX_CLIENT_NUMERIC_SCALE Option

Controls the maximum scale for numeric data sent to the client.

Allowed Values
0 – 126

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When SAP Sybase IQ performs its calculation, it promotes data types to an appropriate scale and size that ensure accuracy. The promoted data type might be larger than the original defined data size. You can set this option to the scale you want for numeric results.

Multiplication, division, addition, subtraction, and aggregate functions can all have results that exceed the maximum precision and scale.

For example, when a DECIMAL(88,2) is multiplied with a DECIMAL(59,2), the result could require a DECIMAL(147,4). With `MAX_CLIENT_NUMERIC_PRECISION` of 126, only 126 digits are kept in the result. If `MAX_CLIENT_NUMERIC_SCALE` is 4, the results are returned as a DECIMAL(126,4). If `MAX_CLIENT_NUMERIC_SCALE` is 2, the result are returned as a DECIMAL(126,2). In both cases, there is a possibility for overflow.

See also
- *MAX_CLIENT_NUMERIC_PRECISION Option* on page 562
- *SCALE Option* on page 614

MAX_CUBE_RESULT Option

Sets the maximum number of rows that the IQ optimizer considers for a **GROUP BY CUBE** operation.

Allowed Values
0 – 4294967295

Default
10000000

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When generating a query plan, the IQ optimizer estimates the total number of groups generated by the **GROUP BY CUBE** hash operation. The IQ optimizer uses a hash algorithm for the **GROUP BY CUBE** operation. This option sets an upper boundary for the number of estimated rows the optimizer considers for a hash algorithm that can be run. If the actual number of rows exceeds the `MAX_CUBE_RESULT` value, the optimizer stops processing the

query and returns the error `Estimate number: nnn exceeds the default MAX_CUBE_RESULT of GROUP BY CUBE or ROLLUP`, where *nnn* is the number estimated by the IQ optimizer.

Set `MAX_CUBE_RESULT` to zero to override the default value. When this option is set to zero, the IQ optimizer does not check the row limit and allows the query to run. Setting `MAX_CUBE_RESULT` to zero is not recommended, as the query might not succeed.

MAX_CURSOR_COUNT Option

Specifies a resource governor to limit the maximum number of cursors that a connection can use at once.

Allowed Values
Integer

Default
50

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The specified resource governor allows a DBA to limit the number of cursors per connection that a user can have. If an operation exceeds the limit for a connection, an error is generated indicating that the limit has been exceeded.

If a connection executes a stored procedure, that procedure is executed under the permissions of the procedure owner. However, the resources used by the procedure are assigned to the current connection.

You can remove resource limits by setting `MAX_CURSOR_COUNT` to 0 (zero).

MAX_HASH_ROWS Option

Sets the maximum number of rows that the IQ optimizer considers for a hash algorithm.

Allowed Values
Integer from 1 to 4294967295

Default
2500000

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When generating a query plan, the IQ optimizer might have several algorithms (hash, sort, indexed) to choose from when processing a particular part of a query. These choices often depend on estimates of the number of rows to process or generate from that part of the query. This option sets an upper boundary for how many estimated rows are considered for a hash algorithm.

For example, if there is a join between two tables, and the estimated number of rows entering the join from both tables exceeds the value of `MAX_HASH_ROWS`, the optimizer does not consider a hash join. On systems with more than 50 MB per user of temporary buffer cache space, you might want to consider a higher value for this option.

MAX_IQ_THREADS_PER_CONNECTION Option

Controls the number of threads for each connection.

Allowed Values
3 – 10000

Default
144

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Allows you to constrain the number of threads (and thereby the amount of system resources) the commands executed on a connection use. For most applications, use the default.

MAX_IQ_THREADS_PER_TEAM Option

Controls the number of threads allocated to perform a single operation (such as a **LIKE** predicate on a column) executing within a connection.

Allowed Values
1 – 10000

Default
144

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Allows you to constrain the number of threads (and thereby the amount of system resources) allocated to a single operation. The total for all simultaneously executing teams for this connection is limited by the related option, `MAX_IQ_THREADS_PER_CONNECTION`. For most applications, use the default.

See also
- *MAX_IQ_THREADS_PER_CONNECTION Option* on page 566

MAX_JOIN_ENUMERATION Option

Controls the maximum number of tables to be optimized for join order after optimizer simplifications have been applied.

Allowed Values
1 – 64

Each **FROM** clause is limited to having at most 64 tables. In practice, however, the effective limit on the number of tables in a **FROM** clause is usually much lower, and is based partially on the complexity of the join relationships among those tables. That effective limit is constrained by the setting for **MAX_JOIN_ENUMERATION**. The optimizer will attempt to simplify the set

of join relationships within a **FROM** clause. If those simplifications fail to reduce the set of the joins that must be simultaneously considered to no more than the current setting for **MAX_JOIN_ENUMERATION**, then the query will return an error.

Warning! Setting **MAX_JOIN_ENUMERATION** over the default value of 16 should only be done with caution, especially in the case of queries with bushy join relationships that can cause the amount of time required by the optimizer increase dramatically. In queries that use only a linear chain of join relationships, a **MAX_JOIN_ENUMERATION** setting of 64 can still provide reasonable optimization times.

Default
15

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The query optimizer simplifies its optimization of join order by separate handling of both lookup tables (that is, nonselective dimension tables) and tables that are effective Cartesian products. After simplification, it proceeds with optimizing the remaining tables for join order, up to the limit set by `MAX_JOIN_ENUMERATION`. If this limit is exceeded, the query is rejected with an error. The user can then either simplify the query or try increasing the limit.

Normally, you should not need to change this value. If you do, set `MAX_JOIN_ENUMERATION` as a temporary or user option.

MAX_PARTITIONED_HASH_MB Option

Sets an upper bound, expressed in megabytes, on the amount of temporary cache space that the optimizer can assume will be available for hash-partitioned hash-based query operators.

Allowed Values
Integer from 0 to 4294967295

Default
0

Scope
Can be set temporary for an individual connection, for a user, or for the PUBLIC group. No system privilege required to set this option. This option takes effect immediately.

Description
When generating a query plan, the IQ optimizer might choose from several algorithms when processing a particular part of a query. These decisions often depend on estimates of the temp cache space that will be required to process that part of the query and on the currently available temp cache. This option sets an upper bound on estimated temporary space usage for operators that can consider a hash-partitioned hash-based algorithm.

The default value of 0 indicates that there is no hard upper bound, and that therefore optimizer's choice will be limited only by the current temp cache availability, the current number of active user connections, and the HASH_PINNABLE_PERCENT option setting.

Note that this option affects only the optimizer's algorithm selection decisions, and that the run-time usage may under some circumstances occasionally exceed this limit.

MAX_PREFIX_PER_CONTAINS_PHRASE Option

Specifies the number of prefix terms allowed in a text search expression.

Allowed Values
0 – 300

Default
1

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Users must be licensed for the Unstructured Data Analytics Option to use **TEXT** indexes and perform full text searches.

MAX_QUERY_PARALLELISM Option

Sets upper bound for parallel execution of **GROUP BY** operations and for arms of a **UNION**.

Allowed Values
Integer less than, greater than or equal to number of CPUs.

Default
64

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This parameter sets an upper bound which limits how parallel the optimizer will permit query operators to go. This can influence the CPU usage for many query join, **GROUP BY**, **UNION**, **ORDER BY**, and other query operators.

Systems with more than 64 CPU cores often benefit from a larger value, up to the total number of CPU cores on the system to a maximum of 512; you can experiment to find the best value for this parameter for your system and queries.

Systems with 64 or fewer CPU cores should not need to reduce this value, unless excessive system time is seen. In that case, you can try reducing this value to determine if that adjustment can lower the CPU system time and improve query response times and overall system throughput.

MAX_QUERY_TIME Option

Sets a time limit so that the optimizer can disallow very long queries.

Allowed Values
0 to 2^{32} - 1 minutes

Default
0 (disabled)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If the query runs longer than the `MAX_QUERY_TIME` setting, SAP Sybase IQ stops the query and sends a message to the user and the IQ message file. For example:

```
The operation has been cancelled -- Max_Query_Time exceeded.
```

`MAX_QUERY_TIME` applies only to queries and not to any SQL statement that is modifying the contents of the database.

MAX_STATEMENT_COUNT Option

Specifies a resource governor to limit the maximum number of prepared statements that a connection can use at once.

Allowed Values
Integer

Default
100

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The specified resource governor allows a DBA to limit the number of prepared statements per connection that a user can have. If an operation exceeds the limit for a connection, an error is generated indicating that the limit has been exceeded.

If a connection executes a stored procedure, that procedure is executed under the permissions of the procedure owner. However, the resources used by the procedure are assigned to the current connection.

You can remove resource limits by setting MAX_STATEMENT_COUNT to 0 (zero).

MAX_TEMP_SPACE_PER_CONNECTION Option

Limits temporary store space used per connection.

Allowed Values
Integer (number of MB)

Default
0 (no limit on temporary store usage)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
By controlling space per connection, this option enables DBAs to manage the space for both loads and queries. If the connection exceeds the run time quota specified by MAX_TEMP_SPACE_PER_CONNECTION, SAP Sybase IQ rolls back the current statement and returns this message to the IQ message file or client user:

```
The current operation has been cancelled:
Max_Temp_Space_Per_Connection exceeded
```

Conditions that may fill the buffer cache include read or write errors, lack of main or temp space, or being out of memory. SAP Sybase IQ may return the first error encountered in these situations and the DBA must determine the appropriate solution.

In a distributed query processing transaction, SAP Sybase IQ uses the values set for the QUERY_TEMP_SPACE_LIMIT and MAX_TEMP_SPACE_PER_CONNECTION options for the shared temporary store by limiting the total shared and local temporary space used by all nodes participating in the distributed query. This means that any single query cannot exceed the total temporary space limit (from IQ_SYSTEM_TEMP and IQ_SHARED_TEMP dbspaces), no matter how many nodes participate.

For example, if the limit is 100 and four nodes use 25 units of temporary space each, the query is within limits. If the sum of the total space used by any of the nodes exceeds 100, however, the query rolls back.

Examples
Set a 500GB limit for all connections:

```
SET OPTION
PUBLIC.MAX_TEMP_SPACE_PER_CONNECTION = 512000
```

Set a 10TB limit for all connections:

```
SET OPTION
PUBLIC.MAX_TEMP_SPACE_PER_CONNECTION = 10485760
```

Set a 5000MB limit for user `wilson`:

```
SET OPTION
wilson.MAX_TEMP_SPACE_PER_CONNECTION = 5000
```

See also

- *QUERY_TEMP_SPACE_LIMIT Option* on page 604

MINIMIZE_STORAGE Option

Minimizes use of disk space for newly created columns in SAP Sybase IQ 15 databases.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Dependencies
`MINIMIZE_STORAGE` applies to databases running with `FP_NBIT_IQ15_COMPATIBILITY='ON'`. If `FP_NBIT_IQ15_COMPATIBILITY='OFF'`, the database engine ignores this option.

Description
If FP_NBIT_IQ15_COMPATIBILITY='ON', MINIMIZE_STORAGE optimizes storage for new columns by using as little as one byte of disk space per row wherever appropriate. By default, this option is 'OFF' for the PUBLIC role, and the specialized storage optimization does not occur for all newly created columns; when MINIMIZE_STORAGE='OFF' for the PUBLIC role but 'ON' as a temporary user option, one-byte storage is used for new columns created by that user ID.

In SAP Sybase IQ 15.x databases, setting MINIMIZE_STORAGE=ON is equivalent to placing an **IQ UNIQUE 255** clause on every new column, with the exception of certain data types that are by nature too wide for one-byte storage. When MINIMIZE_STORAGE='ON', there is no need to specify **IQ UNIQUE**, except for columns with more than 65536 unique values.

When the ratio of main memory to the number of columns is large, turning MINIMIZE_STORAGE='ON' is beneficial. Otherwise, storage of new columns generally benefits by turning this option OFF.

Important: Avoid running a database when FP_NBIT_IQ15_COMPATIBILITY='ON'. All SAP Sybase IQ 15 runtime behavior is available with the SAP Sybase IQ 16.0 interface.

See also
- *FP_LOOKUP_SIZE Option* on page 523
- *INDEX_ADVISOR Option* on page 542
- *FP_LOOKUP_SIZE_PPM Option* on page 524
- *FP_NBIT_IQ15_COMPATIBILITY Option* on page 527

MIN_PASSWORD_LENGTH Option

Sets the minimum length for new passwords in the database.

Allowed Values
Integer greater than or equal to zero

The value is in bytes. For single-byte character sets, this is the same as the number of characters.

Default
3 characters

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Takes effect immediately.

Description
This option imposes a minimum length on all new passwords for greater security. Existing passwords are not affected.

Example
Set the minimum length for new passwords to 6 bytes:

```
SET OPTION PUBLIC.MIN_PASSWORD_LENGTH = 6
```

MIN_ROLE_ADMINS Option

Configures of the minimum number of required administrators for all roles.

Allowed Values
1 – 10

Default
1

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Takes effect immediately.

Description
This options sets the minimum number of required administrators for all roles. This value applies to the minimum number of role administrators for each role, not the minimum number or role administrators for the total number of roles. When dropping roles or users, this value ensures that you never create a scenario where there are no users and roles left with sufficient system privilege to manage the remaining users and roles.

MONITOR_OUTPUT_DIRECTORY Option

Controls placement of output files for the IQ buffer cache monitor.

Allowed Values
String.

Default
Same directory as the database.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required

to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

MONITOR_OUTPUT_DIRECTORY controls the directory in which the IQ monitor output files are created, regardless of what is being monitored or what monitor mode is used. The dummy table used to start the monitor can be either a temporary or a permanent table. The directory can be on any physical machine.

All monitor output files are used for the duration of the monitor runs, which cannot exceed the lifetime of the connection. The output file still exists after the monitor run stops. A connection can run up to two performance monitors simultaneously, one for main cache and one for temp cache. A connection can run a monitor any number of times, successively.

The DBA can use the PUBLIC setting to place all monitor output in the same directory, or set different directories for individual users.

Example

This example shows how you could declare a temporary table for monitor output, set its location, and then have the monitor start sending files to that location for the main and temp buffer caches.

Note: In this example, the output directory string is set to both "/tmp" and "tmp/". The trailing slash ("/") is correct and is supported by the interface. The example illustrates that the buffer cache monitor does not require a permanent table; a temporary table can be used.

```
declare local temporary table dummy_monitor (dummy_column integer)

set option Monitor_Output_Directory = "/tmp"
iq utilities main into dummy_monitor start monitor '-debug -interval
2'

set option Monitor_Output_Directory = "tmp/"

iq utilities private into dummy_monitor start monitor '-debug -
interval 2'
```

MPX_AUTOEXCLUDE_TIMEOUT Option

Timeout for autoexcluding a secondary node on the coordinator node. This option does not apply to the designated failover node.

Allowed Values

0 to 10080 minutes (1 week). 0 indicates that the nodes are not autoexcluded. Values must be exactly divisible by the MPX_HEARTBEAT_FREQUENCY setting in minutes. For example, if

the MPX_HEARTBEAT_FREQUENCY setting is 120 (2 minutes), MPX_AUTOEXCLUDE_TIMEOUT must be divisible by 2.

Default
60 minutes

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Setting takes effect immediately and persists across server restarts.

MPX_HEARTBEAT_FREQUENCY Option

Interval until the heartbeat thread wakes and performs periodic operations, such as checking for coordinator connectivity and cleaning up the connection pool on the secondary node. The heartbeat thread maintains a dedicated internal connection from secondary server to coordinator.

Allowed Values
2 seconds to 3600 seconds

Default
60 seconds

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must restart the server for the change to take effect.

MPX_IDLE_CONNECTION_TIMEOUT Option

Time after which an unused connection in the connection pool on a secondary node will be closed.

Allowed Values
0 sec to no limit

Default
600 seconds

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Setting takes effect immediately and persists across server restarts.

MPX_LIVENESS_TIMEOUT Option

Time, in seconds, before a heartbeat on a secondary server declares the coordinator offline if the heartbeat fails to reconnect to the coordinator after the first disconnect. This option also determines how long the coordinator keeps a global transaction in a suspended state.

Allowed Values
0 to 604800 (1 week) in seconds

Default
3600 seconds (1 hour)

Scope
This option affects all multiplex nodes and has no node-specific or connection-specific value. Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. If you change the value of `MPX_LIVENESS_TIMEOUT` on a running server, the new value takes effect immediately for connections that might suspend in the future. The changed value also immediately affects the remaining timeout period for all current suspended transactions.

Description
If a writer fails to resume a suspended transaction within the `MPX_LIVENESS_TIMEOUT` period, the transaction can no longer commit, and the user should roll back the transaction. The coordinator keeps a global transaction in a suspended state for a period of `2 * MPX_LIVENESS_TIMEOUT`. If the corresponding writer fails to resume the transaction before the `2 * MPX_LIVENESS_TIMEOUT` period, the coordinator rolls back the suspended transaction.

Always specify an `MPX_LIVENESS_TIMEOUT` value that is a multiple of the current `MPX_HEARTBEAT_FREQUENCY` value, which controls the aliveness check period. The coordinator internally doubles the value of `MPX_LIVENESS_TIMEOUT`.

MPX_MAX_CONNECTION_POOL_SIZE Option

Maximum number of connections allowed in the connection pool on a secondary node.

Allowed Values
1 to 1000

Default
10

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Setting takes effect immediately and persists across server restarts.

Description
INC connections are inter-server connections between secondary nodes and the coordinator node. An INC connection is associated with each user connection on a secondary server doing a DDL or read-write operation. The connection is active until that command commits or rolls back; it then returns to the pool. If these transactions are short lived, then the default setting of `MPX_MAX_CONNECTION_POOL_SIZE` suffices for many user connections running DDL or RW operations. If many concurrent connections run DDL or read-write operations, or the transactions take a long time, increase the value of `MPX_MAX_CONNECTION_POOL_SIZE`. For example, increase the value when many user connections do concurrent loads without committing.

Exceeding `MPX_MAX_CONNECTION_POOL_SIZE` returns `SQL Anywhere Error -1004000: The number of connections in the connection pool have exceeded the upper limit`.

To estimate the pool size required, consider the setting of the `-gm` server option. The `-gm` setting indicates how many users can connect to the secondary server; the INC connections are not included, but will add to this number. Use application requirements to assess how many read-write or DDL operations are likely to occur per user, and increase the pool size accordingly.

Each connection (INC or user) carries a memory overhead depending on `-gn` setting and number of cores. The burden of memory and thread contention may affect SAP Sybase IQ server response times.

MPX_MAX_UNUSED_POOL_SIZE Option

Maximum number of unused connections in the connection pool on a secondary node.

Allowed Values
0 to maximum pool size

Default
0

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Setting takes effect immediately and persists across server restarts.

MPX_WORK_UNIT_TIMEOUT Option

Time, in seconds, before a multiplex DQP leader reassigns incomplete distributed work to another DQP worker node.

Allowed Values
0 to 3600 seconds.

DQP work units are typically sized to span only a few seconds. If a worker node goes offline or experiences an unusually high workload, DQP work previously assigned to that worker node is reassigned to another node after the given timeout.

Default
60 seconds

Typically you do not need to change this option from its default value. However, increase this option in rare cases where a query has very large intermediate results that cause individual work units to time out.

Decrease this option if unreliable networks or servers cause distributed work to be lost and the timeout interval is unacceptably long. Note that setting this option too low can cause unnecessary early timeouts.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

NEAREST_CENTURY Option [TSQL]

Controls the interpretation of 2-digit years, in string to date conversions.

Allowed Values
0 – 100

Default
50

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at

the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

NEAREST_CENTURY controls the handling of 2-digit years, when converting from strings to dates or timestamps.

The NEAREST_CENTURY setting is a numeric value that acts as a rollover point. Two-digit years less than the value are converted to 20yy, whereas years greater than or equal to the value are converted to 19yy.

Adaptive Server Enterprise and SAP Sybase IQ behavior is to use the nearest century, so that if the year value *yy* is less than 50, then the year is set to 20yy.

NOEXEC Option

Generates the optimizer query plans instead of executing the plan.

Allowed Values

ON, OFF

Default

OFF

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

When determining how to process a query, the IQ optimizer generates a query plan to map how it plans to have the query engine process the query. If this option is set ON, the optimizer sends the plan for the query to the IQ message file rather than submitting it to the query engine. NOEXEC affects queries and commands that include a query.

Setting NOEXEC ON also prevents the execution of **INSERT...VALUES**, **INSERT...SELECT**, **INSERT...LOCATION**, **SELECT...INTO**, **LOAD TABLE**, **UPDATE**, **TRUNCATE TABLE**, **DELETE**, and updatable cursor operations.

When the EARLY_PREDICATE_EXECUTION option is ON, SAP Sybase IQ executes the local predicates for all queries before generating a query plan, even when the NOEXEC option is ON. The generated query plan is the same as the runtime plan.

See also

- *EARLY_PREDICATE_EXECUTION Option* on page 517

NON_ANSI_NULL_VARCHAR Option

Controls whether zero-length VARCHAR data is treated as NULLs for insert, load, and update operations.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
NON_ANSI_NULL_VARCHAR lets you revert to non-ANSI (Version 12.03.1) behavior for treating zero-length VARCHAR data during load or update operations. When this option is set to OFF, zero-length VARCHAR data is stored as zero-length during load, insert, or update. When this option is set to ON, zero-length VARCHAR data is stored as NULLs on load, insert, or update.

NON_KEYWORDS Option [TSQL]

Turns off individual keywords, allowing their use as identifiers.

Allowed Values
String

Default
" (the empty string)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`NON_KEYWORDS` turns off individual keywords. If you have an identifier in your database that is now a keyword, you can either add double quotes around the identifier in all applications or scripts, or you can turn off the keyword using the `NON_KEYWORDS` option.

This statement prevents **TRUNCATE** and **SYNCHRONIZE** from being recognized as keywords:

```
SET OPTION NON_KEYWORDS = 'TRUNCATE, SYNCHRONIZE'
```

Each new setting of this option replaces the previous setting. This statement clears all previous settings:

```
SET OPTION NON_KEYWORDS =
```

A side effect of the options is that SQL statements using a turned-off keyword cannot be used; they produce a syntax error.

NOTIFY_MODULUS Option

Controls the default frequency of notify messages issued by certain commands.

Allowed Values
Any integer

Default
0 - For new SAP Sybase IQ 16.0 or later databases.

100000 - For pre-16.0 upgraded databases.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option sets the default number of notify messages SAP Sybase IQ issued for certain commands that produce them. The **NOTIFY** clause for some of the commands (such as **CREATE INDEX**, **LOAD TABLE**, and **DELETE**) override this value. Other commands that do not support the **NOTIFY** clause always use this value. The default does not restrict the number of messages you can receive.

ODBC_DISTINGUISH_CHAR_AND_VARCHAR Option

Controls how the SAP Sybase IQ and SQL Anywhere ODBC driver describes CHAR columns.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When a connection is opened, the SAP Sybase IQ and SQL Anywhere ODBC driver uses the setting of this option to determine how `CHAR` columns are described. If `ODBC_DISTINGUISH_CHAR_AND_VARCHAR` is set to OFF (the default), then `CHAR` columns are described as `SQL_VARCHAR`. If this option is set to ON, then `CHAR` columns are described as `SQL_CHAR`. `VARCHAR` columns are always described as `SQL_VARCHAR`.

ON_CHARSET_CONVERSION_FAILURE Option

Controls the action taken, if an error is encountered during character conversion.

Allowed Values

Character Conversion Error	Action
IGNORE	Errors and warnings do not appear.

Character Conversion Error	Action
WARNING	Substitutions and illegal characters are reported as warnings. Illegal characters are not translated.
ERROR	Substitutions and illegal characters are reported as errors.

Default
IGNORE

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`ON_CHARSET_CONVERSION_FAILURE` controls the action taken, if an error is encountered during character conversion.

Single-byte to single-byte converters are not able to report substitutions and illegal characters, and must be set to IGNORE.

ON_ERROR Option [Interactive SQL]

Controls the action taken if an error is encountered while executing statements in Interactive SQL.

Allowed Values

Value	Description
STOP	Interactive SQL stops executing statements from the file and returns to the statement window for input.
PROMPT	Interactive SQL prompts the user to see if he or she wants to continue.
CONTINUE	Errors display in the Messages pane and Interactive SQL continues executing statements.
EXIT	Interactive SQL terminates.

Value	Description
NOTIFY_CONTINUE	The error is reported, and the user is prompted to press **Enter** or click **OK** to continue.
NOTIFY_STOP	The error is reported, and the user is prompted to press **Enter** or click **OK** to stop executing statements.
NOTIFY_EXIT	The error is reported, and the user is prompted to press **Enter** or click **OK** to terminate Interactive SQL.

Default
PROMPT

Description
Controls the action taken, if an error is encountered while executing statements. When you are executing a `.SQL` file, the values STOP and EXIT are equivalent.

ON_TSQL_ERROR Option [TSQL]

Controls error handling in stored procedures.

Allowed Values

Value	Description
STOP	Stops execution immediately upon finding an error.
CONDITIONAL	If the procedure uses **ON EXCEPTION RESUME**, and the statement following the error handles the error, continue; otherwise, exit.
CONTINUE	Continue execution, regardless of the following statement. If there are multiple errors, the first error encountered in the stored procedure is returned. This option most closely mirrors Adaptive Server Enterprise behavior.

Default
CONDITIONAL

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required

to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

ON_TSQL_ERROR controls error handling in stored procedures.

Both CONDITIONAL and CONTINUE settings for ON_TSQL_ERROR are used for Adaptive Server Enterprise compatibility, with CONTINUE most closely simulating Adaptive Server Enterprise behavior. The CONDITIONAL setting is recommended, particularly when developing new Transact-SQL stored procedures, as CONDITIONAL allows errors to be reported earlier.

Adaptive Server Enterprise compatibility is described in *Reference: Building Blocks, Tables, and Procedures*.

When this option is set to STOP or CONTINUE, it supersedes the setting of the CONTINUE_AFTER_RAISERROR option. However, when this option is set to CONDITIONAL (the default), behavior following a **RAISERROR** statement is determined by the setting of the CONTINUE_AFTER_RAISERROR option.

See also

- *CREATE PROCEDURE Statement* on page 159
- *CREATE PROCEDURE Statement [T-SQL]* on page 166
- *RAISERROR Statement [T-SQL]* on page 372
- *CONTINUE_AFTER_RAISERROR Option [TSQL]* on page 487

OS_FILE_CACHE_BUFFERING Option

Controls use of file system buffering for IQ Main dbspaces.

Allowed Values

ON, OFF

Default

OFF; default affects newly created databases only.

Scope

Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description

Setting OS_FILE_CACHE_BUFFERING OFF prevents file system buffering for IQ Main Store files. Turning off file system buffering saves a data copy from the file system buffer

cache to the main IQ buffer cache. Usually this reduces paging caused by competition for memory between the IQ buffer manager and the file system buffer of the operating system. When `OS_FILE_CACHE_BUFFERING` reduces paging, this option improves performance; however, if the IQ page size for the database is less than the block size of the file system (typically only in testing situations), performance decreases, especially during multiuser operation.

Experiment with this option to determine the best setting for different conditions. You must restart the database for the new setting to take effect.

This direct I/O performance option is available on Sun Solaris UFS, Linux, Linux IBM, AIX, and Windows file systems only. This option has no effect on HP-UX and HP-UXi and does not affect databases on raw disk. In Linux, direct I/O is supported in kernel versions 2.6.x.

To enable direct I/O on Linux kernel version 2.6 and AIX, also set the environment variable IQ_USE_DIRECTIO to 1. Direct I/O is disabled by default in Linux kernel version 2.6 and AIX. IQ_USE_DIRECTIO has no effect on Sun Solaris and Windows.

Note: SAP Sybase IQ does not support direct I/O on Linux kernel version 2.4. If you set the IQ_USE_DIRECTIO environment variable on Linux kernel version 2.4, the SAP Sybase IQ server does not start. The error `Error: Invalid Block I/O argument, maybe <pathname> is a directory, or it exceeds maximum file size limit for the platform, or trying to use Direct IO on unsupported OS` is reported.

`OS_FILE_CACHE_BUFFERING_TEMPDB` controls file system buffering for IQ Temporary Store files.

See also

- *OS_FILE_CACHE_BUFFERING_TEMPDB Option* on page 588

OS_FILE_CACHE_BUFFERING_TEMPDB Option

Controls the use of file system buffering for IQ Temporary dbspaces.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must shut down and restart the database for the change to take effect.

Description
Setting `OS_FILE_CACHE_BUFFERING_TEMPDB` to OFF prevents file system buffering for IQ Temporary Store files. Turning off file system buffering saves a data copy from the file system buffer cache to the main IQ buffer cache. Usually this reduces paging caused by competition for memory between the IQ buffer manager and the file system buffer of the operating system. When `OS_FILE_CACHE_BUFFERING_TEMPDB` reduces paging, this option improves performance; however, if the IQ page size for the database is less than the block size of the file system (typically only in testing situations), performance decreases, especially during multiuser operation.

Experiment with this option to determine the best setting for different conditions. You must restart the database for the new setting to take effect.

This direct I/O performance option is available on Sun Solaris UFS, Linux, Linux IBM, AIX, and Windows file systems only. This option has no effect on HP-UX and HP-UXi and does not affect databases on raw disk. In Linux, direct I/O is supported in kernel versions 2.6.x.

To enable direct I/O on Linux kernel version 2.6 and AIX, also set the environment variable IQ_USE_DIRECTIO to 1. Direct I/O is disabled by default in Linux kernel version 2.6 and AIX. IQ_USE_DIRECTIO has no effect on Sun Solaris and Windows.

Note: SAP Sybase IQ

SAP Sybase IQ does not support direct I/O on Linux kernel version 2.4. If you set the IQ_USE_DIRECTIO environment variable on Linux kernel version 2.4, the SAP Sybase IQ server does not start. The error `Error: Invalid Block I/O argument, maybe <pathname> is a directory, or it exceeds maximum file size limit for the platform, or trying to use Direct IO on unsupported OS` is reported.

`OS_FILE_CACHE_BUFFERING` controls file system buffering for IQ Main Store files.

See also

- *OS_FILE_CACHE_BUFFERING Option* on page 587

POST_LOGIN_PROCEDURE Option

Specifies a login procedure whose result set contains messages that are displayed by the client application immediately after a user successfully logs in.

Allowed Values
String

Default
dbo.sa_post_login_procedure

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The default post login procedure, **dbo.sa_post_login_procedure**, executes immediately after a user successfully logs in.

If you have the SET ANY SECURITY OPTION system privilege, you can customize the post login actions by creating a new procedure and setting `POST_LOGIN_PROCEDURE` to call the new procedure. Do not edit **dbo.sa_post_login_procedure**. The customized post login procedure must be created in every database you use.

The post login procedure supports the client applications Interactive SQL, and Interactive SQL Classic.

See also
- *LOGIN_PROCEDURE Option* on page 560

PRECISION Option
Specifies the maximum number of digits in the result of any decimal arithmetic, for queries on the catalog store only.

Allowed Values
126

Default
126

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Takes effect immediately.

Description
Precision is the total number of digits to the left and right of the decimal point. The default `PRECISION` value is fixed at 126. The `SCALE` option specifies the minimum number of digits after the decimal point, when an arithmetic result is truncated to the maximum specified by `PRECISION`, for queries on the catalog store.

Note: In SQL Anywhere, the maximum value supported for the numeric function is 255. If the precision of the numeric function exceeds the maximum value supported, you see the error `The result datatype for function '_funcname' exceeds the maximum supported numeric precision of 255. Please set the proper value for precision in numeric function, 'location'`

See also

- *SCALE Option* on page 614
- *MAX_CLIENT_NUMERIC_PRECISION Option* on page 562

PREFETCH Option

Allows you to turn fetching on or off or to use the ALWAYS value to prefetch the cursor results, even for SENSITIVE cursor types and for cursors that involve a proxy table.

Allowed Values
ON, OFF, ALWAYS

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
For the catalog store only, `PREFETCH` controls whether rows are fetched to the client side before being made available to the client application. Fetching a number of rows at a time, even when the client application requests rows one at a time (for example, when looping over the rows of a cursor) minimizes response time and improves overall throughput by limiting the number of requests to the database.

The setting of PREFETCH is ignored by Open Client and JDBC connections, and for the IQ store.

PREFETCH_BUFFER_LIMIT Option

Specifies the amount of memory used for prefetching.

Allowed Values
Integer

Default
0

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must shut down the database and restart it for the change to take effect.

Description
PREFETCH_BUFFER_LIMIT defines the number of cache pages available to SAP Sybase IQ for use in prefetching (the read-ahead of database pages).

Do not set this option unless advised to do so by Sybase Technical Support.

See also

- *PREFETCH_BUFFER_PERCENT Option* on page 592

PREFETCH_BUFFER_PERCENT Option

Specifies the percent of memory used for prefetching.

Allowed Values
0 – 100

Default
40

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must shut down the database and restart it for the change to take effect.

Description
PREFETCH_BUFFER_PERCENT is an alternative to PREFETCH_BUFFER_LIMIT, as it specifies the percentage of cache available for use in prefetching.

Do not set this option unless advised to do so by Sybase Technical Support.

See also
- *PREFETCH_BUFFER_LIMIT Option* on page 592

PREFETCH_GARRAY_PERCENT Option

Specifies the percent of prefetch resources designated for inserts to **HG** indexes.

Allowed Values
0 – 100

Default
60

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
As with PREFETCH_SORT_PERCENT, this option designates a percentage of prefetch resources for use when inserting into an **HG** index.

Do not set this option unless advised to do so by Sybase Technical Support.

PREFETCH_SORT_PERCENT Option

Specifies the percent of prefetch resources designated for sorting objects.

Allowed Values
0 – 100

Default
20

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`PREFETCH_SORT_PERCENT` designates a percentage of prefetch resources for use by a single sort object. Increasing this value can improve the single-user performance of inserts and deletes, but may have detrimental effects on multiuser operations.

Do not set this option unless advised to do so by Sybase Technical Support.

PRESERVE_SOURCE_FORMAT Option [database]

Controls whether the original source definition of procedures, views, and event handlers is saved in system files. If saved, the formatted source is saved in the column source in `SYSTABLE`, `SYSPROCEDURE`, and `SYSEVENT`.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
When `PRESERVE_SOURCE_FORMAT` is ON, the server saves the formatted source from **CREATE** and **ALTER** statements on procedures, views, and events, and puts original source definition in the source column of the appropriate system table.

Unformatted source text is stored in the same system tables, in the columns `proc_defn`, and `view_defn`. The formatted source column allows you to view the definitions with the spacing, comments, and case that you want.

This option can be turned off to reduce space used to save object definitions in the database. The option can be set only for the `PUBLIC` role.

QUERY_DETAIL Option

Specifies whether or not to include additional query information in the Query Detail section of the query plan.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `QUERY_DETAIL` and `QUERY_PLAN` (or `QUERY_PLAN_AS_HTML`) are both turned on, SAP Sybase IQ displays additional information about the query when producing its query plan. When `QUERY_PLAN` and `QUERY_PLAN_AS_HTML` are OFF, this option is ignored.

When `QUERY_PLAN` is ON (the default), especially if `QUERY_DETAIL` is also ON, you might want to enable message log wrapping or message log archiving to avoid filling up your message log file.

See also
- *QUERY_PLAN Option* on page 596
- *QUERY_PLAN_AS_HTML Option* on page 598

QUERY_NAME Option

Gives a name to an executed query in its query plan.

Allowed Values
Quote-delimited string of up to 80 characters.

Default
" (the empty string)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
You can assign the `QUERY_NAME` option any quote-delimited string value, up to 80 characters. For example:

```
set temporary option Query_Name = 'my third query'
```

When this option is set, query plans that are sent to the `.iqmsg` file or `.html` file include a line near the top of the plan that looks like:

```
Query_Name:  'my third query'
```

If you set the option to a different value before each query in a script, it is much easier to identify the correct query plan for a particular query. The query name is also added to the file name for HTML query plans. This option has no other effect on the query.

QUERY_PLAN Option

Specifies whether or not additional query plans are printed to the SAP Sybase IQ message file.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When this option is turned ON, SAP Sybase IQ produces textual query plans in the IQ message file. These query plans display the query tree topography, as well as details about optimization and execution. When this option is turned OFF, those messages are suppressed. The information is sent to the `<dbname>.iqmsg` file.

See also
- *QUERY_DETAIL Option* on page 595
- *QUERY_PLAN_AFTER_RUN Option* on page 597
- *QUERY_PLAN_AS_HTML Option* on page 598

QUERY_PLAN_AFTER_RUN Option

Prints the entire query plan after query execution is complete.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `QUERY_PLAN_AFTER_RUN` is turned ON, the query plan is printed after the query has finished running. This allows the query plan to include additional information, such as the actual number of rows passed on from each node of the query.

For this option to work, the `QUERY_PLAN` option must be set to ON. You can use this option in conjunction with `QUERY_DETAIL` to generate additional information in the query plan report.

See also
- *QUERY_DETAIL Option* on page 595
- *QUERY_PLAN Option* on page 596
- *QUERY_PLAN_AS_HTML Option* on page 598

QUERY_PLAN_AS_HTML Option

Generates graphical query plans in HTML format for viewing in a Web browser.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`QUERY_PLAN_AS_HTML` causes graphical query plans to be generated in HTML format.

When you set this option, also set the `QUERY_NAME` option for each query, so you know which query is associated with the query plan.

SAP Sybase IQ writes the plans in the same directory as the `.iqmsg` file. Query plan file names follow these conventions:

user-name_query-name_server-type_server-number_*YYYYMMDD_HHMMSS*_**query-number_fragment-number.**`html`

For example, if the user DBA sets the temporary option `QUERY_NAME` to `'Query_1123'`, a file created on November 8, 2012 at exactly 8:30 a.m. is called `DBA_QUERY_1123_L_0__20121108_083000_4.html`. The date, time, and unique **query-number** appended to the file name ensure that existing files are not overwritten. The **server-type** parameter indicates whether the plan originates from a leader (**L**) or worker (**W**) node. The **server-number** identifies the server where the plan originated when all html files are routed to a single directory.

On multiplex servers, worker nodes generate an html file for each fragment executed by the worker, which can result in multiple html files from a single query. These files are identified by **fragment-number**.

Note: If you use this feature, monitor your disk space usage so you leave enough room for your `.iqmsg` and log files to grow. Enable IQ message log wrapping or message log archiving to avoid filling up your message log file.

QUERY_PLAN_AS_HTML acts independently of the setting for the QUERY_PLAN option. In other words, if QUERY_PLAN_AS_HTML is ON, you get an HTML format query plan whether or not QUERY_PLAN is ON.

This feature is supported with newer versions of many commonly used browsers. Some browsers might experience problems with plans generated for very complicated queries.

Simplex Output Example

Output generated from a query plan named Q1123 on a simplex server:

```
DBA_QUERY_Q1123_L_0__20121108_083000_4.html
```

Simplex servers always return a **server-type** parameter that indicates that the plan originated on a leader (**L**) with a **server-number** equal to 0. Simplex output never includes a **fragment-number**.

Multiplex Output Example

Output generated from a query plan named Q101 executed on a multiplex server. The leader node (**L**) **server-number** is 1; worker (**W**) nodes are numbered 2 and 3. Notice the **fragment-number** that appears after the query number in the worker output.

Output generated from the leader node:

```
DBA_L_1_Q101_20121108_083000_94.html
```

Output from one of the worker nodes:

```
DBA_W_2_Q101_20121108_083000_94_2.html
DBA_W_2_Q101_20121108_083000_94_1.html
```

Corresponding output from another worker:

```
DBA_W_3_Q101_20121113-054928_94_2.html
DBA_W_3_Q101_20121113-054933_94_1.html
```

See also

- *QUERY_NAME Option* on page 595
- *QUERY_PLAN Option* on page 596
- *QUERY_PLAN_AFTER_RUN Option* on page 597

QUERY_PLAN_AS_HTML_DIRECTORY Option

Specifies the directory into which SAP Sybase IQ writes the HTML query plans.

Allowed Values
String containing a directory path name

Default
" (the empty string)

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

When the `QUERY_PLAN_AS_HTML` option is turned ON and a directory is specified with the `QUERY_PLAN_AS_HTML_DIRECTORY` option, SAP Sybase IQ writes the HTML query plans in the specified directory. This option provides additional security by allowing HTML query plans to be produced outside of the server directory. When the `QUERY_PLAN_AS_HTML_DIRECTORY` option is not used, the query plans are sent to the default directory (the `.iqmsg` file directory).

If the `QUERY_PLAN_AS_HTML` option is ON and `QUERY_PLAN_AS_HTML_DIRECTORY` is set to a directory that does not exist, SAP Sybase IQ does not save the HTML query plan and no error is generated. In this case, the query continues to run and a message is logged to the IQ message file, so the DBA knows that the HTML query plan was not written. If the specified directory path or permissions on the directory are not correct, the message `Error opening HTML Query plan: file-name` is written in the `.iqmsg` file.

Example

Create the example directory `/system1/users/DBA/html_plans` and set the correct permissions on the directory. Then set the options and run the query:

```
SET TEMPORARY OPTION QUERY_PLAN_AS_HTML = 'ON';
SET TEMPORARY OPTION QUERY_PLAN_AS_HTML_DIRECTORY = '/system1/users/
DBA/html_plans';
SELECT col1 FROM tab1;
```

The HTML query plan is written to a file in the specified directory `/system1/users/DBA/html_plans`.

See also

- *QUERY_PLAN_AS_HTML Option* on page 598

QUERY_PLAN_MIN_TIME Option

Specifies a threshold for query execution. The post-query plan is generated only if query execution time exceeds the threshold.

Allowed Values
Integer, in microseconds.

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
A query with a very short execution time (a *micro query*) executes faster if a query plan is not generated. This option can be set to avoid the generation of query plans, and the associated query plan generation costs for these queries. The QUERY_PLAN_MIN_TIME option is ignored unless the following options are also set:

- QUERY_PLAN = ON or QUERY_PLAN_AS_HTML = ON
- QUERY_PLAN_AFTER_RUN = ON
- QUERY_TIMING = ON

When these options are set, setting a QUERY_PLAN_MIN_TIME query execution threshold prevents the generation of query plans for queries whose execution times exceed the specified threshold.

QUERY_PLAN_TEXT_ACCESS Option

Enables or prevents users from accessing query plans from the Interactive SQL client or from using SQL functions to get plans.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `QUERY_PLAN_TEXT_ACCESS` option is ON, users can view, save, and print query plans from the Interactive SQL client. When the option is OFF, query plans are not cached, and other query plan-related database options have no affect on the query plan display from the Interactive SQL client. This error message displays:

```
No plan available. The database option QUERY_PLAN_TEXT_ACCESS is OFF.
```

See also
- *QUERY_DETAIL Option* on page 595
- *QUERY_PLAN_AFTER_RUN Option* on page 597
- *QUERY_PLAN_AS_HTML Option* on page 598
- *QUERY_PLAN_TEXT_CACHING Option* on page 602
- *OUTPUT Statement [Interactive SQL]* on page 362

QUERY_PLAN_TEXT_CACHING Option

Allows you to specify whether or not SAP Sybase IQ generates and caches IQ plans for queries executed by the user.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
IQ query plans vary in size and can become very large for complex queries. Caching plans for display on the Interactive SQL client can have high resource requirements. The QUERY_PLAN_TEXT_CACHING option gives users a mechanism to control resources for caching plans. With this option turned OFF (the default), the query plan is not cached for that user connection.

Note: If QUERY_PLAN_TEXT_ACCESS is turned OFF, the query plan is not cached for the connections from that user, no matter how QUERY_PLAN_TEXT_CACHING is set.

See also
- *QUERY_DETAIL Option* on page 595
- *QUERY_PLAN_AFTER_RUN Option* on page 597
- *QUERY_PLAN_AS_HTML Option* on page 598
- *QUERY_PLAN_TEXT_ACCESS Option* on page 601
- *OUTPUT Statement [Interactive SQL]* on page 362

QUERY_ROWS_RETURNED_LIMIT Option

Sets the row threshold for rejecting queries based on estimated size of result set.

Allowed Values
Any integer

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If SAP Sybase IQ receives a query that has an estimated number of result rows greater than the value of QUERY_ROWS_RETURNED_LIMIT, it rejects the query with this message:

```
Query rejected because it exceeds resource:
Query_Rows_Returned_Limit
```

If you set this option to zero (the default), there is no limit and no queries are ever rejected based on the number of rows in their output.

QUERY_TEMP_SPACE_LIMIT Option

Specifies the maximum estimated amount of temp space before a query is rejected.

Allowed Values
Any integer

Default
0 (no limit)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If SAP Sybase IQ receives a query that is estimated to require a temporary result space larger than value of this option, it rejects the query with this message:

```
Query rejected because it exceeds total space resource limit
```

When set to zero (the default), there is no limit on temporary store usage by queries.

Users may override this option in their own environments to run queries that can potentially fill up the entire temporary store. To prevent runaway queries from filling up the temporary store, a user with the SET ANY SYSTEM OPTION system privilege can set the option `MAX_TEMP_SPACE_PER_CONNECTION`. The `MAX_TEMP_SPACE_PER_CONNECTION` option monitors and limits actual temporary store usage for all DML statements, not just queries.

In a distributed query processing transaction, SAP Sybase IQ uses the values set for the `QUERY_TEMP_SPACE_LIMIT` and `MAX_TEMP_SPACE_PER_CONNECTION` options for the shared temporary store by limiting the total shared and local temporary space used by all nodes participating in the distributed query. This means that any single query cannot exceed the total temp space limit (from `IQ_SYSTEM_TEMP` and `IQ_SHARED_TEMP` dbspaces), no matter how many nodes participate.

For example, if the limit is 100 and four nodes use 25 units of temporary space each, the query is within limits. If the sum of the total space used by any of the nodes exceeds 100, however, the query rolls back.

See also

- *MAX_TEMP_SPACE_PER_CONNECTION Option* on page 572

QUERY_TIMING Option

Determines whether or not to collect specific timing statistics and display them in the query plan.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option controls the collection of timing statistics on subqueries and some other repetitive functions in the query engine.

Query timing is represented in the query plan detail as a series of timestamps. These timestamps correspond to query operator phases (Conditions, Prepare, Fetch, Complete). HTML and Interactive SQL query plans display query timing graphically as a timeline.

QUOTED_IDENTIFIER Option [TSQL]

Controls the interpretation of strings that are enclosed in double quotes.

Allowed Values
ON, OFF

Default
ON

OFF for Open Client connections.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at

the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

`QUOTED_IDENTIFIER` controls whether strings enclosed in double quotes are interpreted as identifiers (ON) or as literal strings (OFF). This option is included for Transact-SQL compatibility.

Sybase Control Center and Interactive SQL set `QUOTED_IDENTIFIER` temporarily to ON, if it is set to OFF. A message is displayed informing you of this change. The change is in effect only for the Sybase Control Center or Interactive SQL connection. The JDBC driver also temporarily sets `QUOTED_IDENTIFIER` to ON.

RECOVERY_TIME Option

Sets the maximum length of time, in minutes, that the database server takes to recover from system failure.

Allowed Values

Integer, in minutes

Default

2

Scope

Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must restart the server for the change to take effect.

Description

Use this option with the `CHECKPOINT_TIME` option to decide when checkpoints should be done.

A heuristic measures the recovery time based on the operations since the last checkpoint. Thus, the recovery time is not exact.

See also

- *CHECKPOINT_TIME Option* on page 486

RESERVED_KEYWORDS Option

Turns on individual keywords that are disabled by default.

Allowed Values
String

Default
Empty string

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
This option turns on individual keywords that are disabled by default. Only the LIMIT keyword can be turned on.

Examples
The following statement allows the LIMIT keyword to be recognized as a keyword:

```
SET OPTION RESERVED_KEYWORDS = 'LIMIT';
```

You cannot turn on the keywords SET, OPTION, and OPTIONS. The following determine whether a word is identified as a keyword (in order of precedence):

- It appears in the SQL Anywhere list of reserved words
- It is turned on with the RESERVED_KEYWORDS option
- It is turned off with the NON_KEYWORDS option

Each setting of this option replaces the previous setting. The following statement clears all previous settings:

```
SET OPTION RESERVED_KEYWORDS = ;
```

RETURN_DATE_TIME_AS_STRING Option

Controls how a date, time, or timestamp value is passed to the client application when queried.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set as a temporary option only, for the duration of the current connection or for the PUBLIC role.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Takes effect immediately.

Description
`RETURN_DATE_TIME_AS_STRING` indicates whether date, time, and timestamp values are returned to applications as a date or time data type or as a string.

When this option is set to ON, the server converts the date, time, or timestamp value to a string before it is sent to the client in order to preserve the `TIMESTAMP_FORMAT`, `DATE_FORMAT`, or `TIME_FORMAT` option setting.

Sybase Control Center and Interactive SQL automatically turn the `RETURN_DATE_TIME_AS_STRING` option ON.

See also
- *DATE_FORMAT Option* on page 500
- *TIME_FORMAT Option* on page 642
- *TIMESTAMP_FORMAT Option* on page 643

REVERT_TO_V15_OPTIMIZER Option

Setting this option ON forces the query optimizer to mimic SAP Sybase IQ 15.x behavior.

Allowed Values
ON, OFF

Default

- ON in all 16.0 databases upgraded from 15.x
- OFF in all newly created 16.0 databases

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. If permitted, can be set for an arbitrary other user or role, or for all users via the role. Takes effect immediately.

Description
SAP Sybase IQ 16.0 supports several new join and grouping algorithms that leverage Hash and Hash-Range partitioned tables, as well as a few other new algorithms. By default, all of these new algorithms are considered by the optimizer and will be selected where valid and appropriate. Setting `REVERT_TO_V15_OPTIMIZER='ON'` disables all 16.0 changes to the optimizer cost models. It also disables all of these new join and grouping algorithms, unless they are valid and are specifically requested via a positive value for either the `AGGREGATION_PREFERENCE` option, the `JOIN_PREFERENCE` option, or a join condition hint string.

The `REVERT_TO_V15_OPTIMIZER` option is normally used for internal testing and manually tuning queries. Only experienced DBAs should use it.

Note: An error will result if your query references an RLV-enabled table and `REVERT_TO_V15_OPTIMIZER='ON'`.

ROUND_TO_EVEN Option

Controls behavior of the SQL function **ROUND**.

Allowed Values
ON, OFF

Default
OFF

Scope
Requires the SET ANY SYSTEM OPTION system privilege. Can be set for the PUBLIC role only. Takes effect immediately.

Description
When `ROUND_TO_EVEN` option is set to ON, the **ROUND** function rounds half to the nearest even number. When the option is set to OFF, the **ROUND** function rounds SAP Sybase IQ half away from zero.

Sybase Control Center and Interactive SQL automatically turn the `ROUND_TO_EVEN` option OFF.

The **ROUND** function returns a different value based on whether `ROUND_TO_EVEN` is ON or OFF.

When `ROUND_TO_EVEN` is set ON, `SELECT ROUND (convert(double, 0.25), 1) from iq_dummy` returns 0.2.

When `ROUND_TO_EVEN` is set OFF, `SELECT ROUND (convert(double, 0.25), 1) from iq_dummy` returns 0.3.

ROW_COUNT Option

Limits the number of rows returned from a query.

Allowed Values
Integer.

Default
0 (no limit on rows returned)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When this runtime option is set to a nonzero value, query processing stops after the specified number of rows.

This option affects only statements with the keyword **SELECT** and does not affect **UPDATE** and **DELETE** statements.

The **SELECT** statement keywords **FIRST** and **TOP** also limit the number of rows returned from a query. Using **FIRST** is the same as setting the `ROW_COUNT` database option to 1. Using **TOP** is the same as setting `ROW_COUNT` to the same number of rows. If both **TOP** and `ROW_COUNT` are set, then the value of **TOP** takes precedence.

The `ROW_COUNT` option could produce non-deterministic results when used in a query involving global variables, system functions or proxy tables. Such queries are partly executed using CIS (Component Integrated Services). In such cases, use **SELECT TOP** *n* instead of setting `ROW_COUNT`, or set the global variable to a local one and use that local variable in the query.

See also

- *QUERY_ROWS_RETURNED_LIMIT Option* on page 603
- *SELECT Statement* on page 407

RV_AUTO_MERGE_EVAL_INTERVAL Option

This option configures the evaluation period used to determine when an automated merge of the row-level versioned (RLV) and IQ main stores should occur.

Allowed Values
1 – MAX_UINT (minutes)

Default
15 (minutes)

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
This option is be used to configure the period of wait time, in minutes, between activations of the merge evaluator. The merge evaluator examines the merge parameters of each row-level versioning (RLV) enabled table against configured threshold values to determine whether a non-blocking (background) merge of the RLV table to IQ main stores should occur.

If the interval ends while the evaluator is active, or when a merge is already in progress, the interval re-sets.

Any new value for the interval is used when the merge evaluator is next activated.

RV_MERGE_NODE_MEMSIZE Option

An automated merge of the row-level versioned (RLV) store and IQ main stores occurs based on the merge thresholds, including RV_MERGE_NODE_MEMSIZE. When this node threshold is exceeded, a merge will be triggered.

Allowed Values
0 - 100 (percent)

Default
75 (percent)

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
This option sets the percentage of total RLV memory size as a merge threshold for the node. If the total RLV memory size surpasses the threshold, the merge condition evaluator will determine which table(s) to merge. If multiple tables must be merged to satisfy the node threshold, parallel merges will be triggered for each table to be merged.

RV_MERGE_TABLE_MEMPERCENT Option

An automated merge of the row-level versioned (RLV) store and IQ main stores occurs based on the merge thresholds, including RV_MERGE_TABLE_MEMPERCENT. If this table threshold is exceeded, a merge will be triggered for the specific table.

Allowed Values
0 - 100 (percent)

Default
0 (percent)

Note: When RV_MERGE_TABLE_MEMPERCENT = 0, then the system uses a (per-table) threshold of 100% / N, where N is the number of RLV-enabled tables that have been loaded.

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
This option sets the percentage of memory used as a merge threshold for an RLV-enabled table. If the memory used surpasses the threshold, a merge will occur.

The system evaluates whether to merge the RLV and IQ main stores on a per-table basis. It enumerates through all loaded RLV tables, and for each one decides whether a merge is warranted. A merge for a single table is deemed warranted if:

1. The table violates either the memory threshold (RV_MERGE_TABLE_MEMPERCENT) or the row threshold (RV_MERGE_TABLE_NUMROWS), and
2. The system does not determine that a large percentage of the RLV rows are uncommitted, and are therefore unable to be merged.

RV_MERGE_TABLE_NUMROWS Option

An automated merge of the row-level versioned (RLV) store and IQ main stores occurs based on the merge thresholds, including RV_MERGE_TABLE_NUMROWS. If this table threshold is exceeded, a merge will be triggered for the specific table.

Allowed Values
1000 - 100000000

Default
10000000

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
This option sets the number of rows used as a merge threshold for an RLV-enabled table. If the number of rows used surpasses the threshold, a merge will occur.

The system evaluates whether to merge the RLV and IQ main stores on a per-table basis. It enumerates through all loaded RLV tables, and for each one decides whether a merge is warranted. A merge for a single table is deemed warranted if:

1. The table violates either the memory threshold (RV_MERGE_TABLE_MEMPERCENT) or the row threshold (RV_MERGE_TABLE_NUMROWS), and
2. The system does not determine that a large percentage of the RLV rows are uncommitted, and are therefore unable to be merged.

RV_RESERVED_DBSPACE_MB Option

A portion of the RLV store must be reserved for memory used by data structures during critical operations.

Allowed Values
Integer greater than or equal to 50 (megabytes)

Default
The minimum of 50 Mb or half the size of the RLV dbspace

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately. The server does not need to be restarted in order to change reserved space size.

Description
This option allows you to control the amount of space set aside in the RLV store for small but critical data structures used during release savepoint, commit, and rollback operations.

SCALE Option

Specifies the minimum number of digits after the decimal point when an arithmetic result is truncated to the maximum `PRECISION`, for queries on the catalog store only.

Allowed Values
Integer, with a maximum of 126.

Default
38

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Takes effect immediately.

Description
This option specifies the minimum number of digits after the decimal point when an arithmetic result is truncated to the maximum `PRECISION`, for queries on the catalog store.

Multiplication, division, addition, subtraction, and aggregate functions may all have results that exceed the maximum precision.

See also

- *MAX_CLIENT_NUMERIC_SCALE Option* on page 563
- *PRECISION Option* on page 590

SNAPSHOT_VERSIONING Option

Applies to RLV-enabled tables only (as opposed to all base tables in the database). Controls whether RLV-enabled tables are accessed using single-writer table-level versioning, or multiple writer row-level versioning. This option does not apply to the IQ catalog store.

Allowed Values

Value	Action
row-level	Enables concurrent writer access and row-level versioning for RLV-enabled tables. The first transaction to modify a table row establishes a row write lock that persists until the end of the transaction. Subsequent transactions attempting to modify a locked row either fail with a lock/future version error, or block until the lock is released based on the value of the BLOCKING option.
table-level	Enables single-writer access and table-level versioning. The first transaction to access the table establishes a table write lock which persists until the end of the transaction. Subsequent transactions attempting to write to a locked table either fail with a lock/future version error, or block until the lock is released based on the value of the BLOCKING option.

Default
table-level

Scope
Requires the SET ANY PUBLIC OPTION system privilege to set this option for PUBLIC or for other user or role.

SIGNIFICANTDIGITSFORDOUBLEEQUALITY Option

Specifies the number of significant digits to the right of the decimal in exponential notation that are used in equality tests between two complex arithmetic expressions.

Allowed Values
0 – 15

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Because doubles are stored in binary (base 2) instead of decimal (base 10), this setting gives the approximate number of significant decimal digits used. If set to 0, all digits are used.

For example, when `SIGNIFICANTDIGITSFORDOUBLEEQUALITY` is set to 12, these numbers compare as equal; when set to 13, they do not:

- 1.23456789012345
- 1.23456789012389

`SIGNIFICANTDIGITSFORDOUBLEEQUALITY` affects equality tests between two complex arithmetic expressions, not those done by the indexes.

SORT_COLLATION Option

Allows implicit use of the **SORTKEY** function on **ORDER BY** expressions.

Allowed Values
Internal, collation_name, or collation_id

Default
Internal

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When the value of SORT_COLLATION is Internal, the **ORDER BY** clause remains unchanged.

When the value of this option is set to a valid collation name or collation ID, any string expression in the **ORDER BY** clause is treated as if the **SORTKEY** function has been invoked.

Functions are described in *Reference: Building Blocks, Tables, and Procedures*.

Example
Set the sort collation to binary:

```
SET TEMPORARY OPTION sort_collation='binary';
```

Setting the sort collation to binary transforms these queries:

```
SELECT Name, ID
FROM Products
ORDER BY Name, ID;
SELECT Name, ID
FROM Products
ORDER BY 1, 2;
```

The queries are transformed into:

```
SELECT Name, ID
FROM Products
ORDER BY SORTKEY(Name, 'binary'), ID;
```

SORT_PINNABLE_CACHE_PERCENT Option

Specifies the maximum percentage of currently available buffers a sort object tries to pin.

Allowed Values
0 – 100

Default
20

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
For very large sorts, a larger value might help reduce the number of merge phases required by the sort. A larger number, however, might impact the sorts and hashes of other users running on the system. If you change this option, experiment to find the best value to increase performance, as choosing the wrong value might decrease performance.

Tip: Use the default value for `SORT_PINNABLE_CACHE_PERCENT`.

This option is primarily for use by Sybase Technical Support. If you change the value of `SORT_PINNABLE_CACHE_PERCENT`, do so with extreme caution.

SQL_FLAGGER_ERROR_LEVEL Option [TSQL]

Controls the behavior in response to any SQL code that is not part of the specified standard.

Allowed Values

- OFF
- SQL:1992/Entry
- SQL:1992/Intermediate
- SQL:1992/Full
- SQL:1999/Core
- SQL:1999/Package
- SQL:2003/Core
- SQL:2003/Package

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Flags as an error any SQL code that is not part of a specified standard. For example, specifying SQL:2003/Package causes the database server to flag syntax that is not full SQL/2003 syntax.

For compatibility with previous SAP Sybase IQ versions, the values in this table are also accepted, and are mapped as specified.

Table 24. SQL_FLAGGER_ERROR_LEVEL Compatibility Values

Value	Action
E	Flag syntax that is not entry-level SQL92 syntax. Corresponds to SQL:1992/Entry.
I	Flag syntax that is not intermediate-level SQL92 syntax. Corresponds to SQL:1992/Intermediate.
F	Flag syntax that is not full-SQL92 syntax. Corresponds to SQL:1992/Full.
W	Allow all supported syntax. Corresponds to OFF.

SQL_FLAGGER_WARNING_LEVEL Option [TSQL]

Controls the response to any SQL that is not part of the specified standard.

Allowed Values

- OFF
- SQL:1992/Entry
- SQL:1992/Intermediate
- SQL:1992/Full
- SQL:1999/Core
- SQL:1999/Package
- SQL:2003/Core
- SQL:2003/Package

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Flags as an error any SQL code that is not part of a specified standard as a warning. For example, specifying SQL:2003/Package causes the database server to flag syntax that is not full SQL/2003 syntax.

The default behavior, OFF, turns warning flagging off.

For compatibility with previous SAP Sybase IQ versions, the values in this table are also accepted, and are mapped as specified.

Table 25. SQL_FLAGGER_WARNING_LEVEL Compatibility Values

Value	Action
E	Flag syntax that is not entry-level SQL92 syntax. Corresponds to SQL:1992/ Entry.
I	Flag syntax that is not intermediate-level SQL92 syntax. Corresponds to SQL: 1992/Intermediate.
F	Flag syntax that is not full-SQL92 syntax. Corresponds to SQL:1992/Full.
W	Allow all supported syntax. Corresponds to OFF.

STRING_RTRUNCATION Option [TSQL]

Determines whether an error is raised when an **INSERT** or **UPDATE** truncates a `CHAR` or `VARCHAR` string.

Allowed Values
ON, OFF

Default
ON

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If the truncated characters consist only of spaces, no exception is raised. ON corresponds to SQL92 behavior. When `STRING_RTRUNCATION` is OFF, the exception is not raised and the character string is silently truncated. If the option is ON and an error is raised, a **ROLLBACK** occurs.

This option was OFF by default prior to SAP Sybase IQ 15.0. It can safely be set to OFF for backward compatibility. However, the ON setting is preferable to identify statements where truncation may cause data loss.

SUBQUERY_CACHING_PREFERENCE Option

Controls which algorithm to use for processing correlated subquery predicates.

Allowed Values

Value	Action
1	Use sort-based processing for the first subquery predicate. Other subquery predicates that do not have the same ordering key are processed using a hash table to cache subquery results.
2	Use the hash table to cache results for all subquery predicates when it is legal. If available temp cache cannot accommodate all of the subquery results, performance may be poor.
3	Cache one previous subquery result. Does not use **SORT** and **HASH**.
0	Let the optimizer choose.
-1	Avoid using **SORT**. The IQ optimizer chooses **HASH** if it is legal.
-2	Avoid using **HASH**. The IQ optimizer chooses **SORT** or cache-one value if it is legal.
-3	Avoid using cache-one value. The IQ optimizer chooses either **HASH** or **SORT** if it is legal.

Default

0

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

For correlated subquery predicates, the IQ optimizer offers a choice of caching outer references and subquery results that reduces subquery execution costs. `SUBQUERY_CACHING_PREFERENCE` lets you override the optimizer's costing decision when choosing which algorithm to use. It does not override internal rules that determine whether an algorithm is legal within the query engine.

A setting of a non-zero value affects every subquery predicate in the query. A non-zero value cannot be used selectively for one subquery predicate in a query.

SUBQUERY_CACHING_PREFERENCE is normally used for internal testing by experienced DBAs only. It does not apply to **IN** subqueries.

See also

- *IN_SUBQUERY_PREFERENCE Option* on page 541

SUBQUERY_FLATTENING_PERCENT Option

Allows the user to change the threshold at which the optimizer decides to transform scalar subqueries into joins.

Allowed Values

Value	Action
0	The optimizer cost model decides
1 to (2^{32} -1)	The percentage of references at which to flatten

Default
100

Scope
This option only applies to correlated scalar subqueries. Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately. If you set SUBUERY_FLATTENING_PERCENT to a non-default value, every scalar subquery predicate in the query is affected; this option cannot be used selectively for one scalar subquery predicate in a query.

Description
The SAP Sybase IQ query optimizer can convert a correlated scalar subquery into an equivalent join operation to improve query performance. The SUBQUERY_FLATTENING_PERCENT option allows the user to adjust the threshold at which this optimization occurs.

SCALAR_FLATTENING_PERCENT represents a percent of estimated inner distinct values to estimated outer distinct values in a scalar subquery. As the estimated percent approaches 100%, the cost of evaluating the subquery as a join is likely to be smaller than using individual

index probes. The value may be set larger than 100%, since the estimated inners are not guaranteed to be less than estimated outers.

See also

- *SUBQUERY_FLATTENING_PREFERENCE Option* on page 623

SUBQUERY_FLATTENING_PREFERENCE Option

Allows a user to override the decisions of the optimizer when transforming (flattening) scalar or **EXISTS** subqueries into joins.

Allowed Values

Value	Action
-3	Avoid flattening both **EXISTS** and scalar subqueries to a join operation.
-2	Avoid flattening a scalar subquery to a join operation.
-1	Avoid flattening an **EXISTS** subquery to a join operation.
0	Allow the IQ optimizer to decide to flatten subqueries.
1	Ignore cost flattening **EXIST**, if possible.
2	Ignore cost flattening scalar, if possible.
3	Ignore cost of both **EXISTS** and scalar subquery.

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately. If you set the option to a non-zero value, every subquery predicate in the query is affected; this option cannot be used selectively for one subquery predicate in a query.

Description
The SAP Sybase IQ optimizer may convert a correlated scalar subquery or an **EXISTS** or **NOT EXISTS** subquery into an equivalent join operation to improve query performance. This optimization is called *subquery flattening*. `SUBQUERY_FLATTENING_PREFERENCE`

allows you to override the costing decision of the optimizer when choosing the algorithm to use.

Setting SUBQUERY_FLATTENING_PREFERENCE to 0 (allow the IQ optimizer to decide to flatten subqueries) is equivalent to setting the now deprecated FLATTEN_SUBQUERIES option to ON in earlier versions of SAP Sybase IQ.

See also

- *SUBQUERY_FLATTENING_PERCENT Option* on page 622

SUBQUERY_PLACEMENT_PREFERENCE Option

Controls the placement of correlated subquery predicate operators within a query plan.

Allowed Values

Value	Action
-1	Prefer the lowest possible location in the query plan, thereby placing the execution of the subquery as early as possible within the query.
0	Let the optimizer choose.
1	Prefer the highest possible location in the query plan, thereby delaying the execution of the subquery to as late as possible within the query.

Default

0

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

For correlated subquery operators within a query, the IQ optimizer may have a choice of several different valid locations within that query's plan.
SUBQUERY_PLACEMENT_PREFERENCE allows you to override the optimizer's cost-based decision when choosing the placement location. It does not override internal rules that determine whether a location is valid, and in some queries, there might be only one valid choice. If you set this option to a nonzero value, it affects every correlated subquery predicate in a query; it cannot be used to selectively modify the placement of one subquery out of several in a query.

This option is normally used for internal testing, and only experienced DBAs should use it.

The default setting of this option is almost always appropriate. Occasionally, Sybase Technical Support might ask you to change this value.

SUPPRESS_TDS_DEBUGGING Option

Determines whether TDS debugging information appears in the server window.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When the server is started with the **-z** option, debugging information appears in the server window, including debugging information about the TDS protocol.

`SUPPRESS_TDS_DEBUGGING` restricts the debugging information about TDS that appears in the server window. When this option is set to OFF (the default), TDS debugging information appears in the server window.

SWEEPER_THREADS_PERCENT Option

Specifies the percentage of SAP Sybase IQ threads used to sweep out buffer caches.

Allowed Values
1 – 40

Default
10

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must shut down the database and restart it for the change to take effect.

Description
SAP Sybase IQ uses a small percentage of its processing threads as sweeper threads. These sweeper threads clean out dirty pages in the main and temp buffer caches.

In the IQ Monitor **-cache** report, the GDirty column shows the number of times the LRU buffer was grabbed in a "dirty" (modified) state. If GDirty is greater than 0 for more than a brief time, you might need to increase `SWEEPER_THREADS_PERCENT` or `WASH_AREA_BUFFERS_PERCENT`.

The default setting of this option is almost always appropriate. Occasionally, SAP Sybase Technical Support might ask you to increase this value.

See also
- *WASH_AREA_BUFFERS_PERCENT Option* on page 650

TDS_EMPTY_STRING_IS_NULL Option [database]

Controls whether empty strings are returned as NULL or a string containing one blank character for TDS connections.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`TDS_EMPTY_STRING_IS_NULL` is set to OFF by default and empty strings are returned as a string containing one blank character for TDS connections. When this option is set to ON, empty strings are returned as NULL strings for TDS connections. Non-TDS connections distinguish empty strings from NULL strings.

TEMP_EXTRACT_APPEND Option

Specifies that any rows extracted by the data extraction facility are added to the end of an output file.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option specifies that any rows extracted by the data extraction facility are added to the end of an output file. You create the output file in a directory where you have WRITE/EXECUTE permissions and you set WRITE permission on the directory and output file for the user name used to start SAP Sybase IQ (for example, sybase). You can give permissions on the output file to other users as appropriate. The name of the output file is specified in the `TEMP_EXTRACT_NAME1` option. The data extraction facility creates the output file, if the file does not already exist.

`TEMP_EXTRACT_APPEND` is not compatible with the `TEMP_EXTRACT_SIZEn` options. If you try to restrict the size of the extract append output file, SAP Sybase IQ reports an error.

See also
- *TEMP_EXTRACT_NAMEn Options* on page 631

TEMP_EXTRACT_BINARY Option

In combination with the `TEMP_EXTRACT_SWAP` option, specifies the type of extraction performed by the data extraction facility.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Use this option with the `TEMP_EXTRACT_SWAP` option to specify the type of extraction performed by the data extraction facility.

Table 26. Extraction Option Settings for Extraction Type

Extraction type	TEMP_EXTRACT_BINARY	TEMP_EXTRACT_SWAP
binary	ON	OFF
binary/swap	ON	ON
ASCII	OFF	OFF

The default extraction type is ASCII.

See also
- *TEMP_EXTRACT_SWAP Option* on page 639

TEMP_EXTRACT_COLUMN_DELIMITER Option

Specifies the delimiter between columns in the output of the data extraction facility for an ASCII extraction.

Allowed Values
String

Default
','

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required

to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

Use TEMP_EXTRACT_COLUMN_DELIMITER to specify the delimiter between columns in the output of the data extraction facility. In the case of an ASCII extraction, the default is to separate column values with commas. Strings are unquoted by default.

The delimiter must occupy 1 – 4 bytes, and must be valid in the collation order you are using, if you are using a multibyte collation order. Choose a delimiter that does not occur in any of the data output strings themselves.

If you set this option to the empty string '' for ASCII extractions, the extracted data is written in fixed-width ASCII with no column delimiter. Numeric and binary data types are right-justified on a field of *n* blanks, where *n* is the maximum number of bytes needed for any value of that type. Character data types are left-justified on a field of *n* blanks.

Note: The minimum column width in a fixed-width ASCII extraction is 4 bytes to allow the string “NULL” for a NULL value. For example, if the extracted column is CHAR(2) and TEMP_EXTRACT_COLUMN_DELIMITER is set to the empty string '', there are two spaces after the extracted data.

See also

- *TEMP_EXTRACT_QUOTE Option* on page 634
- *TEMP_EXTRACT_QUOTES Option* on page 635
- *TEMP_EXTRACT_QUOTES_ALL Option* on page 636
- *TEMP_EXTRACT_ROW_DELIMITER Option* on page 637

TEMP_EXTRACT_DIRECTORY Option

Controls whether a user is allowed to use the data extraction facility. Also controls the directory into which temp extract files are placed and overrides a directory path specified in the TEMP_EXTRACT_NAMEn options.

Allowed Values

string

Default

'' (the empty string)

Scope

Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at

the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

If the `TEMP_EXTRACT_DIRECTORY` option is set to the string FORBIDDEN (case insensitive) for a user, then that user is not allowed to perform data extracts. An attempt by this user to use the data extraction facility results in the error: `You do not have permission to perform Extracts`.

If `TEMP_EXTRACT_DIRECTORY` is set to FORBIDDEN for the `PUBLIC` role, then no one can run data extraction.

If `TEMP_EXTRACT_DIRECTORY` is set to a valid directory path, temp extract files are placed in that directory, overriding a path specified in the `TEMP_EXTRACT_NAMEn` options.

If `TEMP_EXTRACT_DIRECTORY` is set to an invalid directory path, an error occurs: `Files does not exist File: <invalid path>`

If `TEMP_EXTRACT_DIRECTORY` is blank, then temp extract files are placed in directories according to their specification in `TEMP_EXTRACT_NAMEn`. If no path is specified as part of `TEMP_EXTRACT_NAMEn`, the extract files are by default placed in the server startup directory.

This option provides increased security and helps control disk management by restricting the creation of large data extraction files to the directories for which a user has write access.

For details on the data extraction facility and using the extraction options, see *Administration: Load Management*.

See also

- *TEMP_EXTRACT_NAMEn Options* on page 631

TEMP_EXTRACT_ESCAPE_QUOTES Option

Specifies whether all quotes in fields containing quotes are escaped in the output of the data extraction facility for an ASCII extraction.

Allowed Values

ON, OFF

Default

OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option is ignored unless **TEMP_EXTRACT_QUOTE** is the default or set to the value of "" (double quotes), and **TEMP_EXTRACT_BINARY** is OFF, and either **TEMP_EXTRACT_QUOTES** or **TEMP_EXTRACT_QUOTES_ALL** is ON.

See also
- *TEMP_EXTRACT_BINARY Option* on page 627
- *TEMP_EXTRACT_QUOTES Option* on page 635
- *TEMP_EXTRACT_QUOTES_ALL Option* on page 636

TEMP_EXTRACT_NAMEn Options

Specifies the names of the output files or named pipes used by the data extraction facility. There are eight options: `TEMP_EXTRACT_NAME1` through `TEMP_EXTRACT_NAME8`.

Allowed Values
string

Default
" (the empty string)

Scope
Requires the SET ANY PUBLIC OPTION system privilege to set this option for PUBLIC or for other user or role.

Description
`TEMP_EXTRACT_NAME1` through `TEMP_EXTRACT_NAME8` specify the names of the output files used by the data extraction facility. You must use these options sequentially. For example, `TEMP_EXTRACT_NAME3` has no effect unless both the options `TEMP_EXTRACT_NAME1` and `TEMP_EXTRACT_NAME2` are already set.

The most important of these options is `TEMP_EXTRACT_NAME1`. If `TEMP_EXTRACT_NAME1` is set to its default setting (the empty string "), extraction is disabled and no output is redirected. To enable extraction, set `TEMP_EXTRACT_NAME1` to a

path name. Extract starts extracting into a file with that name. Choose a path name to a file that is not otherwise in use.

Tip: Set the TEMP_EXTRACT_NAME1 option as TEMPORARY.

You can also use TEMP_EXTRACT_NAME1 to specify the name of the output file, when the TEMP_EXTRACT_APPEND option is set ON. In this case, before you execute the **SELECT** statement, set WRITE permission for the user name used to start SAP Sybase IQ (for example, sybase) on the directory or folder containing the named file and on the named file. In append mode, the data extraction facility adds extracted rows to the end of the file and does not overwrite the data that is already in the file. If the output file does not already exist, the data extraction facility creates the file.

Warning! If you choose the path name of an existing file and the TEMP_EXTRACT_APPEND option is set OFF (the default), the file contents are overwritten. This might be what you require if the file is for a weekly report, for example, but not if the file is one of your database files.

The options TEMP_EXTRACT_NAME2 through TEMP_EXTRACT_NAME8 can be used in addition to TEMP_EXTRACT_NAME1 to specify the names of multiple output files.

If you are extracting to a single disk file or a single named pipe, leave the options TEMP_EXTRACT_NAME2 through TEMP_EXTRACT_NAME8 and TEMP_EXTRACT_SIZE1 through TEMP_EXTRACT_SIZE8 at their default values.

When TEMP_EXTRACT_NAME1 is set, you cannot perform these operations:

- **LOAD**, **DELETE**, **INSERT,** or **INSERT...LOCATION** to a table that is the top table in a join
- **INSERT...SELECT**

Also note these restrictions on the data extraction facility:

- Extract works only with data stored in the IQ store.
- Extract does not work on system tables or cross database joins.
- Extract does not work with queries that use user-defined functions or system functions, except for the system functions **suser_id()** and **suser_name()**.
- If you run Interactive SQL with the **-q** (quiet mode) option and the data extraction commands are in a command file, you must first set and make permanent the Interactive SQL option “Show multiple result sets.” If this option is not set, the output file is not created.

  To set the “Show multiple result sets” option, select Tools > Options in the Interactive SQL window, then check the box “Show multiple result sets” and click “Make permanent.”

The directory path specified using the TEMP_EXTRACT_NAMEn options can be overridden with the TEMP_EXTRACT_DIRECTORY option.

See also

- *TEMP_EXTRACT_APPEND Option* on page 627

- *TEMP_EXTRACT_DIRECTORY Option* on page 629
- *TEMP_EXTRACT_SIZEn Options* on page 637

TEMP_EXTRACT_NULL_AS_EMPTY Option

Controls the representation of null values in the output of the data extraction facility for an ASCII extraction.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`TEMP_EXTRACT_NULL_AS_EMPTY` controls the representation of null values in the output of the data extraction facility for ASCII extractions. When the `TEMP_EXTRACT_NULL_AS_EMPTY` option is set to ON, a null value is represented as '' (the empty string) for all data types.

The quotes shown above are not present in the extract output file. When the `TEMP_EXTRACT_NULL_AS_EMPTY` option is set to OFF, the string 'NULL' is used in all cases to represent a NULL value. OFF is the default value.

TEMP_EXTRACT_NULL_AS_ZERO Option

Controls the representation of null values in the output of the data extraction facility for an ASCII extraction.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`TEMP_EXTRACT_NULL_AS_ZERO` controls the representation of null values in the output of the data extraction facility for ASCII extractions. When `TEMP_EXTRACT_NULL_AS_ZERO` is set to ON, a null value is represented as follows:

- '0' for arithmetic type
- '' (the empty string) for the `CHAR` and `VARCHAR` character types
- '' (the empty string) for dates
- '' (the empty string) for times
- '' (the empty string) for timestamps

The quotes shown above are not present in the extract output file. When the `TEMP_EXTRACT_NULL_AS_ZERO` option is set to OFF, the string 'NULL' is used in all cases to represent a NULL value. OFF is the default value.

Note: In SAP Sybase IQ 12.5, an ASCII extract from a `CHAR` or `VARCHAR` column in a table always returns at least four characters to the output file. This is required if `TEMP_EXTRACT_NULL_AS_ZERO` is set to OFF, because SAP Sybase IQ needs to write out the word NULL for any row in a column that has a null value. Reserving four spaces is not required if `TEMP_EXTRACT_NULL_AS_ZERO` is set to ON.

In SAP Sybase IQ 12.6, if `TEMP_EXTRACT_NULL_AS_ZERO` is set to ON, the number of characters that an ASCII extract writes to a file for a `CHAR` or `VARCHAR` column equals the number of characters in the column, even if that number is less than four.

TEMP_EXTRACT_QUOTE Option

Specifies the string to be used as the quote to enclose fields in the output of the data extraction facility for an ASCII extraction, when either the `TEMP_EXTRACT_QUOTES` option or the `TEMP_EXTRACT_QUOTES_ALL` option is set ON.

Allowed Values
String

Default
" (the empty string)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option specifies the string to be used as the quote to enclose fields in the output of the data extraction facility for an ASCII extraction, if the default value is not suitable. `TEMP_EXTRACT_QUOTE` is used with the `TEMP_EXTRACT_QUOTES` and `TEMP_EXTRACT_QUOTES_ALL` options. The quote string specified in the `TEMP_EXTRACT_QUOTE` option has the same restrictions as the row and column delimiters. The default for this option is the empty string, which SAP Sybase IQ converts to the single quote mark.

The string specified in the `TEMP_EXTRACT_QUOTE` option must occupy from 1 to a maximum of 4 bytes and must be valid in the collation order you are using, if you are using a multibyte collation order. Be sure to choose a string that does not occur in any of the data output strings themselves.

See also
- *TEMP_EXTRACT_COLUMN_DELIMITER Option* on page 628
- *TEMP_EXTRACT_QUOTES Option* on page 635
- *TEMP_EXTRACT_QUOTES_ALL Option* on page 636
- *TEMP_EXTRACT_ROW_DELIMITER Option* on page 637

TEMP_EXTRACT_QUOTES Option

Specifies that string fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
This option specifies that string fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction. The string used as the quote is specified in the `TEMP_EXTRACT_QUOTE` option, if the default is not suitable.

See also
- *TEMP_EXTRACT_COLUMN_DELIMITER Option* on page 628
- *TEMP_EXTRACT_QUOTES_ALL Option* on page 636
- *TEMP_EXTRACT_ROW_DELIMITER Option* on page 637

TEMP_EXTRACT_QUOTES_ALL Option

Specifies that all fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction.

Allowed Values
ON, OFF

Default
OFF

Scope
Requires the SET ANY PUBLIC OPTION system privilege to set this option for PUBLIC or for other user or role.

Description
`TEMP_EXTRACT_QUOTES_ALL` specifies that all fields are enclosed in quotes in the output of the data extraction facility for an ASCII extraction. The string used as the quote is specified in `TEMP_EXTRACT_QUOTE`, if the default is not suitable.

See also
- *TEMP_EXTRACT_COLUMN_DELIMITER Option* on page 628
- *TEMP_EXTRACT_QUOTES Option* on page 635
- *TEMP_EXTRACT_QUOTES_ALL Option* on page 636

- *TEMP_EXTRACT_ROW_DELIMITER Option* on page 637

TEMP_EXTRACT_ROW_DELIMITER Option

Specifies the delimiter between rows in the output of the data extraction facility for an ASCII extraction.

Allowed Values
String

Default
" (the empty string)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`TEMP_EXTRACT_ROW_DELIMITER` specifies the delimiter between rows in the output of the data extraction facility. In the case of an ASCII extraction, the default is to end the row with a newline on UNIX platforms and with a carriage return/newline pair on Windows platforms.

The delimiter must occupy 1 – 4 bytes and must be valid in the collation order you are using, if you are using a multibyte collation order. Choose a delimiter that does not occur in any of the data output strings. The default for the `TEMP_EXTRACT_ROW_DELIMITER` option is the empty string. SAP Sybase IQ converts the empty string default for this option to the newline on UNIX platforms and to the carriage return/newline pair on Windows platforms.

See also
- *TEMP_EXTRACT_COLUMN_DELIMITER Option* on page 628
- *TEMP_EXTRACT_QUOTES Option* on page 635
- *TEMP_EXTRACT_QUOTES_ALL Option* on page 636

TEMP_EXTRACT_SIZEn Options

Specifies the maximum sizes of the corresponding output files used by the data extraction facility.

Allowed Values
There are eight options: `TEMP_EXTRACT_SIZE1` through `TEMP_EXTRACT_SIZE8`.

Device Type	Size
Disk file	AIX and HP-UX: 0 – 64GB Sun Solaris & Linux: 0 – 512GB Windows: 0 – 128GB
Tape*	524288KB (0.5GB)
Other	9007199254740992KB (8192 Petabytes “unlimited”)

*Tape devices currently are not supported.

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`TEMP_EXTRACT_SIZE1` through `TEMP_EXTRACT_SIZE8` are used to specify the maximum sizes of the corresponding output files used by the data extraction facility. `TEMP_EXTRACT_SIZE1` specifies the maximum size of the output file specified by `TEMP_EXTRACT_NAME1`, `TEMP_EXTRACT_SIZE2` specifies the maximum size of the output file specified by `TEMP_EXTRACT_NAME2`, and so on.

When large file systems, such as JFS2, support file size larger than the default value, set `TEMP_EXTRACT_SIZEn` to the value that the file system allows. For example, to support lTB set option:

```
TEMP_EXTRACT_SIZE1 = 1073741824 KB
```

If you are extracting to a single disk file or a single named pipe, leave the options `TEMP_EXTRACT_NAME2` through `TEMP_EXTRACT_NAME8` and `TEMP_EXTRACT_SIZE1` through `TEMP_EXTRACT_SIZE8` at their default values.

The `TEMP_EXTRACT_SIZE`*n* options are not compatible with `TEMP_EXTRACT_APPEND`. If you try to restrict the size of the extract append output file, SAP Sybase IQ reports an error.

See also

- *TEMP_EXTRACT_NAMEn Options* on page 631

TEMP_EXTRACT_SWAP Option

In combination with the `TEMP_EXTRACT_BINARY` option, specifies the type of extraction performed by the data extraction facility.

Allowed values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
Use this option with the `TEMP_EXTRACT_BINARY` option to specify the type of extraction performed by the data extraction facility.

Table 27. Extraction Option Settings for Extraction Type

Extraction type	TEMP_EXTRACT_BINARY	TEMP_EXTRACT_SWAP
binary	ON	OFF
binary/swap	ON	ON
ASCII	OFF	OFF

The default extraction type is ASCII.

See also

- *TEMP_EXTRACT_BINARY Option* on page 627

TEMP_RESERVED_DBSPACE_MB Option

Controls the amount of space SAP Sybase IQ reserves in the temporary IQ store.

Allowed Values
Integer greater than or equal to 200 in megabytes

Default
200; SAP Sybase IQ actually reserves a maximum of 50% and a minimum of 1% of the last read-write file in `IQ_SYSTEM_TEMP`

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately. The server does not need to be restarted in order to change reserved space size.

Description
`TEMP_RESERVED_DBSPACE_MB` lets you control the amount of space SAP Sybase IQ sets aside in your temporary IQ store for certain small but critical data structures used during release savepoint, commit, and checkpoint operations. For a production database, set this value between 200MB and 1GB. The larger your IQ page size and number of concurrent connections, the more reserved space you need.

Reserved space size is calculated as a maximum of 50% and a minimum of 1% of the last read-write file in `IQ_SYSTEM_TEMP`.

TEMP_SPACE_LIMIT_CHECK Option

Checks for catalog store temporary space on a per connection basis.

Allowed Values
ON, OFF (no limit checking occurs)

Default
ON

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
When `TEMP_SPACE_LIMIT_CHECK` is ON, the database server checks the amount of catalog store temporary file space that a connection uses. If a connection requests more than its

quota of temporary file space when this option is set to OFF, a fatal error can occur. When this option is set to ON, if a connection requests more than its quota of temporary file space, the request fails and the error "`Temporary space limit exceeded`" is returned.

Two factors are used to determine the temporary file quota for a connection: the maximum size of the temporary file, and the number of active database connections. The maximum size of the temporary file is the sum of the current size of the file and the amount of disk space available on the partition containing the file. When limit checking is turned on, the server checks a connection for exceeding its quota when the temporary file has grown to 80% or more of its maximum size, and the connection requests more temporary file space. Once this happens, any connection fails that uses more than the maximum temporary file space divided by the number of active connections.

Note: This option is unrelated to IQ temporary store space. To constrain the growth of IQ temporary space, use the `QUERY_TEMP_SPACE_LIMIT` option and `MAX_TEMP_SPACE_PER_CONNECTION` option.

You can obtain information about the space available for the temporary file using the **sa_disk_free_space system** procedure.

Example
A database is started with the temporary file on a drive with 100MB free and no other active files on the same drive. The available temporary file space is 100MB. The DBA enters:

```
SET OPTION PUBLIC.TEMP_SPACE_LIMIT_CHECK = 'ON'
```

As long as the temporary file stays below 80MB, the server behaves as it did before. Once the file reaches 80MB, the new behavior might occur. Assume that with 10 queries running, the temporary file needs to grow. When the server finds that one query is using more than 8MB of temporary file space, that query fails.

TEXT_DELETE_METHOD Option

Specifies the algorithm used during a delete in a **TEXT** index.

Allowed Values
0 – 2

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

Users must be licensed for the Unstructured Data Analytics Option to use **TEXT** indexes.

TIME_FORMAT Option

Sets the format used for times retrieved from the database.

Allowed values
A string composed of the symbols HH, NN, MM, SS, separated by colons.

Default
'HH:NN:SS.SSS'

For Open Client and JDBC connections the default is also set to HH:NN:SS.SSS.

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The format is a string using these symbols:

- hh – Two-digit hours (24 hour clock).
- nn – Two-digit minutes.
- mm – Two-digit minutes if following a colon (as in 'hh:mm').
- ss[.s...s] – Two-digit seconds plus optional fraction.

Each symbol is substituted with the appropriate data for the date being formatted. Any format symbol that represents character rather than digit output can be in uppercase, which causes the substituted characters also to be in uppercase. For numbers, using mixed case in the format string suppresses leading zeros.

Multibyte characters are not supported in format strings. Only single-byte characters are allowed, even when the collation order of the database is a multibyte collation order like 932JPN.

See also

- *DATE_FORMAT Option* on page 500

- *RETURN_DATE_TIME_AS_STRING Option* on page 607

TIMESTAMP_FORMAT Option

Sets the format used for timestamps retrieved from the database.

Allowed Values
A string composed of the symbols listed below.

Default
'YYYY-MM-DD HH:NN:SS.SSS'

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
The format is a string using these symbols:

Table 28. TIMESTAMP_FORMAT String Symbols

Symbol	Description
yy	2-digit year.
yyyy	4-digit year.
mm	2-digit month, or two digit minutes if following a colon (as in 'hh:mm').
mmm	3-character short form for name of the month of year
mmmm[m...]	Character long form for month name—as many characters as there are m's, until the number of m’s specified exceeds the number of characters in the month’s name.
dd	2-digit day of month.
ddd	3-character short form for name of the day of week.
dddd[d...]	Character long form for day name—as many characters as there are d's, until the number of d’s specified exceeds the number of characters in the day’s name.
hh	2-digit hours.

Symbol	Description
nn	2-digit minutes.
ss.SSS	Seconds (ss) and fractions of a second (SSS), up to six decimal places. Not all platforms support timestamps to a precision of six places.
aa	a.m. or p.m. (12-hour clock).
pp	p.m. if needed (12-hour clock.)

Each symbol is substituted with the appropriate data for the date being formatted. Any format symbol that represents character rather than digit output can be in uppercase, which causes the substituted characters also to be in uppercase. For numbers, using mixed case in the format string suppresses leading zeros.

Multibyte characters are not supported in format strings. Only single-byte characters are allowed, even when the collation order of the database is a multibyte collation order like 932JPN.

See also

- *DATE_FORMAT Option* on page 500
- *RETURN_DATE_TIME_AS_STRING Option* on page 607

TOP_NSORT_CUTOFF_PAGES Option

Sets the result size threshold for **TOP N** algorithm selection.

Allowed Values
1 – 1000

Default
1

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`TOP_NSORT_CUTOFF_PAGES` sets the threshold, measured in pages, where evaluation of a query that contains both a **TOP** clause and **ORDER BY** clause switches algorithms from

ordered list-based processing to sort-based processing. Ordered list processing performs better in cases where the **TOP N** value is smaller than the number of result rows. Sort-based processing performs better for large **TOP N** values.

In some cases, increasing `TOP_NSORT_CUTOFF_PAGES` can improve performance by avoiding sort-based processing.

See also

- *SELECT Statement* on page 407

TRIM_PARTIAL_MBC Option

Allows automatic trimming of partial multibyte character data.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. Takes effect immediately.

Description
Provides consistent loading of data for collations that contain both single-byte and multibyte characters. When `TRIM_PARTIAL_MBC` is ON:

- A partial multibyte character is replaced with a blank when loading into a `CHAR` column.
- A partial multibyte character is truncated when loading into a `VARCHAR` column.

When `TRIM_PARTIAL_MBC` is OFF, normal `CONVERSION_ERROR` semantics are in effect.

See also

- *CONVERSION_ERROR Option [TSQL]* on page 488

TRUSTED_CERTIFICATES_FILE Option

Specifies the trust relationship for outbound Transport Layer Security (TLS) connections made by LDAP User Authentication, INC, and MIPC connections.

Allowed Values
A valid network path to the location of a TXT file containing the list of trusted certificate authorities that sign server certificates.

Default
NULL, meaning that no outbound TLS connection can be started because there are no trusted certificate authorities.

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Takes effect immediately.

Description
This option identifies the path to the location of the list of trusted certificate authorities. The list must be stored in a TXT file. The file may be shared in a location in a Windows environment on the local drive to be used by all SAP Sybase applications on that machine.

TSQL_VARIABLES Option [TSQL]

Controls whether the @ sign can be used as a prefix for Embedded SQL host variable names.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
When `TSQL_VARIABLES` is set to ON, you can use the @ sign instead of the colon as a prefix for host variable names in Embedded SQL. This is implemented primarily for the Open Server Gateway.

USER_RESOURCE_RESERVATION Option

Adjusts memory use for the number of current users.

Allowed Values
Integer

Default
1

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
SAP Sybase IQ tracks the number of open cursors and allocates memory accordingly. In certain circumstances, you can use this option to adjust the minimum number of current cursors that SAP Sybase IQ thinks is currently using the product, and allocate memory from the temporary cache more sparingly.

Set this option only after careful analysis shows it is actually required. If you need to set this parameter, contact Sybase Technical Support with details.

VERIFY_PASSWORD_FUNCTION Option

Specifies a user-supplied authentication function that can be used to implement password rules.

Allowed Values
String

Default
" (the empty string). (No function is called when a password is set.)

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required

to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY SECURITY OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description

When the VERIFY_PASSWORD_FUNCTION option value is set to a valid string, the statement **GRANT CONNECT TO** *userid* **IDENTIFIED BY** *password* calls the function specified by the option value.

The option value requires the form *owner.function_name* to prevent users from overriding the function.

The function takes two parameters:

- *user_name* VARCHAR(128)
- *new_pwd* VARCHAR(255)

The return value type is VARCHAR(255).

If VERIFY_PASSWORD_FUNCTION is set, you cannot specify more than one userid and password with the **GRANT CONNECT** statement.

Example

The following sample code defines a table and a function and sets some login policy options. Together they implement advanced password rules that include requiring certain types of characters in the password, disallowing password reuse, and expiring passwords. The function is called by the database server with the verify_password_function option when a user ID is created or a password is changed. The application can call the procedure specified by the post_login_procedure option to report that the password should be changed before it expires.

```
-- only DBA should have privileges on this table
CREATE TABLE DBA.t_pwd_history(
        pk          INT         DEFAULT AUTOINCREMENT PRIMARY KEY,
        user_name   CHAR(128),  -- the user whose password is set
        pwd_hash    CHAR(32) ); -- hash of password value to detect
                                -- duplicate passwords

-- called whenever a non-NULL password is set
-- to verify the password conforms to password rules
CREATE FUNCTION DBA.f_verify_pwd( uid     VARCHAR(128),
                                  new_pwd VARCHAR(255) )
RETURNS VARCHAR(255)
BEGIN
    -- enforce password rules
    -- enforce minimum length (can also be done with
    -- min_password_length option)
    IF length( new_pwd ) < 6 THEN
        RETURN 'password must be at least 6 characters long';
    END IF;
```

```
    -- number of lowercase characters IN new_pwd
    SELECT count(*) INTO num_lower_chars
       FROM pwd_chars WHERE CAST( c AS BINARY ) BETWEEN 'a' AND 'z';

    -- enforce rules based on characters contained in new_pwd
    IF ( SELECT count(*) FROM pwd_chars WHERE c BETWEEN '0' AND '9' )
           < 1 THEN
        RETURN 'password must contain at least one numeric digit';
    ELSEIF length( pwd_alpha_only ) < 2 THEN
        RETURN 'password must contain at least two letters';
    ELSEIF num_lower_chars = 0
           OR length( pwd_alpha_only ) - num_lower_chars = 0 THEN
        RETURN 'password must contain both upper- and lowercase
characters';
    END IF;

    -- not the same as any user name
    -- (this could be modified to check against a disallowed words
table)
    IF EXISTS( SELECT * FROM SYS.SYSUSER
                    WHERE lower( user_name ) IN
( lower( pwd_alpha_only ),
                                              lower( new_pwd ) ) ) THEN
       RETURN 'password or only alphabetic characters in password '
||
              'must not match any user name';
    END IF;

    -- not the same as any previous password for this user
    IF EXISTS( SELECT * FROM t_pwd_history
                    WHERE user_name = uid
                   AND pwd_hash = hash( uid || new_pwd, 'md5' ) ) THEN
        RETURN 'previous passwords cannot be reused';
    END IF;

    -- save the new password
    INSERT INTO t_pwd_history( user_name, pwd_hash )
        VALUES( uid, hash( uid || new_pwd, 'md5' ) );

    RETURN( NULL );
END;

ALTER FUNCTION DBA.f_verify_pwd SET HIDDEN;
GRANT EXECUTE ON DBA.f_verify_pwd TO PUBLIC;
SET OPTION PUBLIC.verify_password_function = 'DBA.f_verify_pwd';


-- All passwords expire in 180 days. Expired passwords can be changed
-- by the user using the NewPassword connection parameter.
ALTER LOGIN POLICY DEFAULT password_life_time = 180;

-- If an application calls the procedure specified by the
-- post_login_procedure option, then the procedure can be used to
-- warn the user that their password is about to expire. In
particular,
```

```
-- Interactive SQL calls the post_login_procedure.
ALTER LOGIN POLICY DEFAULT password_grace_time = 30;
```

To turn the option off, set it to the empty string:

```
SET OPTION PUBLIC.VERIFY_PASSWORD_FUNCTION = ''
```

See also

- *ALTER FUNCTION Statement* on page 16
- *GRANT CONNECT Statement* on page 298

WASH_AREA_BUFFERS_PERCENT Option

Specifies the percentage of the buffer caches above the wash marker.

Allowed Values
1 – 100

Default
20

Scope
Option can be set at the database (PUBLIC) level only.

Requires the SET ANY SYSTEM OPTION system privilege to set this option. You must shut down the database and restart it for the change to take effect.

Description
SAP Sybase IQ buffer caches are organized as a long MRU/LRU chain. The area above the wash marker is used to sweep out (that is, write) dirty pages to disk.

In the IQ Monitor **-cache** report, the Gdirty column shows the number of times the LRU buffer was grabbed in a "dirty" (modified) state. If GDirty is greater than 0 for more than a brief time, you might need to increase `SWEEPER_THREADS_PERCENT` or `WASH_AREA_BUFFERS_PERCENT`.

Note: Before changing this option, check the value of the `CACHE_AFFINITY_PERCENT` option. `WASH_AREA_BUFFERS_PERCENT` affects the LRU side of the buffer cache and `CACHE_AFFINITY_PERCENT` affects the MRU side. The total of these two values cannot exceed 100 percent.

The default setting of this option is almost always appropriate. Occasionally, SAP Sybase Technical Support might ask you to increase this value.

See also

- *SWEEPER_THREADS_PERCENT Option* on page 625

WAIT_FOR_COMMIT Option

Determines when foreign key integrity is checked as data is manipulated.

Allowed Values
ON, OFF

Default
OFF

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
If this option is set to ON, the database does not check foreign key integrity until the next **COMMIT** statement. Otherwise, all foreign keys not created with the `CHECK ON COMMIT` option are checked as they are inserted, updated, or deleted.

WD_DELETE_METHOD Option

Specifies the algorithm used during a delete in a **WD** index.

Allowed Values

Value	Acton
0	The delete method is selected by the cost model. Cost model only selects either mid or large method for deletion.
1	Forces small method for deletion. Small method is useful when the number of rows being deleted is a very small percentage of the total number of rows in the table. Small delete can randomly access the index, causing cache thrashing with large datasets.

Value	Acton
2	Forces large method for deletion. This algorithm scans the entire index searching for rows to delete. Large method is useful when the number of rows being deleted is a high percentage of the total number of rows in the table.
3	Forces mid method for deletion. Mid method is a variation of the small method that accesses the index in order and is generally faster than the small method.

Default
0

Scope
Option can be set at the database (PUBLIC) or user level. When set at the database level, the value becomes the default for any new user, but has no impact on existing users. When set at the user level, overrides the PUBLIC value for that user only. No system privilege is required to set option for self. System privilege is required to set at database level or at user level for any user other than self.

Requires the SET ANY PUBLIC OPTION system privilege to set this option. Can be set temporary for an individual connection or for the PUBLIC role. Takes effect immediately.

Description
`WD_DELETE_METHOD` specifies the algorithm used during a delete operation in a **WD** index. When this option is not set or is set to 0, the delete method is selected by the cost model. The cost model considers the CPU related costs as well as I/O related costs in selecting the appropriate delete algorithm. The cost model takes into account:

- Rows deleted
- Index size
- Width of index data type
- Cardinality of index data
- Available temporary cache
- Machine related I/O and CPU characteristics
- Available CPUs and threads

Example
Force the large method for deletion from a **WD** index:

```
SET TEMPORARY OPTION WD_DELETE_METHOD = 2
```

Index

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W