Reference Manual: Building Blocks

Adaptive Server® Enterprise

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Contents

About This Book

The *Adaptive Server Reference Manual* includes four guides to Sybase® Adaptive Server® Enterprise and the Transact-SQL® language:

- *Building Blocks* describes the "parts" of Transact-SQL: datatypes, built-in functions, global variables, expressions and identifiers, reserved words, and SQLSTATE errors. Before you can use Transact-SQL sucessfully, you must understand what these building blocks do and how they affect the results of Transact-SQL statements.
- *Commands* provides reference information about the Transact-SQL commands, which you use to create statements.
- *Procedures* provides reference information about system procedures, catalog stored procedures, extended stored procedures, and dbcc stored procedures. All procedures are created using Transact-SQL statements.
- *Tables* provides reference information about the system tables, which store information about your server, databases, users, and other details of your server. It also provides information about the tables in the dbccdb and dbccalt databases.

Conventions

The following sections describe conventions used in the Reference Manual guides.

SQL is a free-form language. There are no rules about the number of words you can put on a line or where you must break a line. However, for readability, all examples and most syntax statements in this manual are formatted so that each clause of a statement begins on a new line. Clauses that have more than one part extend to additional lines, which are indented. Complex commands are formatted using modified Backus Naur Form (BNF) notation.

Table 1 shows the conventions for syntax statements that appear in this manual:

Table 1: Font and syntax conventions for this manual

Element	Example
Command names,procedure names, utility names, database names, datatypes, and other keywords display in sans serif font.	select sp_configure master database
Book names, file names, variables, and path names are in italics.	*System Administration Guide* *sql.ini* file *column_name* *$SYBASE/ASE* directory
Variables—or words that stand for values that you fill in—when they are part of a query or statement, are in italics in Courier font.	`select` *`column_name`* `from` *`table_name`* `where` *`search_conditions`*
Type parentheses as part of the command.	compute *row_aggregate* (*column_name*)
Double colon, equals sign indicates that the syntax is written in BNF notation. Do not type this symbol. Indicates "is defined as".	`::=`
Curly braces mean that you must choose at least one of the enclosed options. Do not type the braces.	`{cash, check, credit}`
Brackets mean that to choose one or more of the enclosed options is optional. Do not type the brackets.	`[cash | check | credit]`
The comma means you may choose as many of the options shown as you want. Separate your choices with commas as part of the command.	`cash, check, credit`
The pipe or vertical bar (|) means you may select only one of the options shown.	`cash | check | credit`

An ellipsis (...) means that you can *repeat* the last unit as many times as you like.	`buy thing = price [cash | check | credit]`
	`[, thing = price [cash | check | credit]]...`
	You must buy at least one thing and give its price. You may choose a method of payment: one of the items enclosed in square brackets. You may also choose to buy additional things: as many of them as you like. For each thing you buy, give its name, its price, and (optionally) a method of payment.

- Syntax statements (displaying the syntax and all options for a command) appear as follows:

  sp_dropdevice [*device_name*]

  For a command with more options:

  select *column_name*
  from *table_name*
  where *search_conditions*

In syntax statements, keywords (commands) are in normal font and identifiers are in lowercase. Italic font shows user-supplied words.

- Examples showing the use of Transact-SQL commands are printed like this:

```
select * from publishers
```

- Examples of output from the computer appear as follows:

```
pub_id    pub_name                 city          state
-------   ---------------------    -----------   -----
0736      New Age Books            Boston        MA
0877      Binnet & Hardley         Washington    DC
1389      Algodata Infosystems     Berkeley      CA

(3 rows affected)
```

In this manual, most of the examples are in lowercase. However, you can disregard case when typing Transact-SQL keywords. For example, SELECT, Select, and select are the same.

Adaptive Server sensitivity to the case of database objects, such as table names, depends on the sort order installed on Adaptive Server. You can change case sensitivity for single-byte character sets by reconfiguring the Adaptive Server sort order. For more information, see the *System Administration Guide*.

CHAPTER 1

System and User-Defined Datatypes

This chapter describes the Transact-SQL datatypes, which specify the type, size, and storage format of columns, stored procedure parameters, and local variables.

Datatype categories

Adaptive Server provides several system datatypes and the user-defined datatypes timestamp, sysname, and longsysname. Table 1-1 lists the categories of Adaptive Server datatypes. Each category is described in a section of this chapter.

Table 1-1: Datatype categories

Category	Used for
Exact numeric datatypes	Numeric values (both integers and numbers with a decimal portion) that must be represented exactly
Approximate numeric datatypes	Numeric data that can tolerate rounding during arithmetic operations
Money datatypes	Monetary data
Timestamp datatype	Tables that are browsed in Client-Library™ applications
Date and time datatypes	Date and time information
Character datatypes	Strings consisting of letters, numbers, and symbols
Binary datatypes	Raw binary data, such as pictures, in a hexadecimal-like notation
bit datatype	True/false and yes/no type data
sysname and longsysname datatypes	System tables
text, image, and unitext datatypes	Printable characters or hexadecimal-like data that requires more than the maximum column size provided by your server's logical page size.
Abstract datatypes	Adaptive Server supports abstract datatypes through Java classes. See *Java in Adaptive Server Enterprise* for more information.
User-defined datatypes	Defining objects that inherit the rules, default, null type, IDENTITY property, and base datatype of the datatypes listed in this table. text undergoes character-set conversion if client is using a different character set, image does not.

Range and storage size

Table 1-2 lists the system-supplied datatypes and their synonyms and provides information about the range of valid values and storage size for each. For simplicity, the datatypes are printed in lowercase characters, although Adaptive Server allows you to use either uppercase or lowercase characters for system datatypes. User-defined datatypes, such as timestamp, are *case-sensitive*. Most Adaptive Server-supplied datatypes are not reserved words and can be used to name other objects.

Table 1-2: Adaptive Server system datatypes

Datatypes by category	Synonyms	Range	Bytes of storage
Exact numeric: integers			

Datatypes by category	Synonyms	Range	Bytes of storage
bigint		Whole numbers between 2^{63} and -2^{63} - 1 (from -9,223,372,036,854,775,808 to +9,223,372,036,854,775,807, inclusive.	8
int	integer	2^{31} -1 (2,147,483,647) to -2^{31} (-2,147,483,648	4
smallint		2^{15} -1 (32,767) to -2^{15} (-32,768)	2
tinyint		0 to 255 (Negative numbers are not permitted)	1
unsigned bigint		Whole numbers between 0 and 18,446,744,073,709,551,615	8
unsigned int		Whole numbers between 0 and 4,294,967,295	4
unsigned smallint		Whole numbers between 0 and 65535	2
Exact numeric: decimals			
numeric (p, s)		10^{38} -1 to -10^{38}	2 to 17
decimal (p, s)	dec	10^{38} -1 to -10^{38}	2 to 17
Approximate numeric			
float (precision)		machine dependent	4 for default precision < 16, 8 for default precision >= 16
double precision		machine dependent	8
real		machine dependent	4
Money			
smallmoney		214,748.3647 to -214,748.3648	4
money		922,337,203,685,477.5807 to -922,337,203,685,477.5808	8
Date/time			
smalldatetime		January 1, 1900 to June 6, 2079	4
datetime		January 1, 1753 to December 31, 9999	8
date		January 1, 0001 to December 31, 9999	4
time		12:00:00AM to 11:59:59:990PM	4
bigdatetime		January 1, 0001 to December 31, 9999 and 12:00.000000AM to 11:59:59.999999 PM	8

Datatypes by category	Synonyms	Range	Bytes of storage
bigtime		12:00:00.000000 AM to 11:59:59.999999 PM	8
Character			
char(n)	character	pagesize	n
varchar(n)	character varying, char varying	pagesize	actual entry length
unichar	Unicode character	pagesize	*n* * *@@unicharsize* (*@@unicharsize* equals 2)
univarchar	Unicode character varying, char varying	pagesize	actual number of characters * *@@unicharsize*
nchar(n)	national character, national char	pagesize	*n* * *@@ncharsize*
nvarchar(n)	nchar varying, national char varying, national character varying	pagesize	*@@ncharsize* * number of characters
text		2^{31} -1 (2,147,483,647) bytes or fewer	0 when uninitialized; multiple of 2K after initialization
unitext		1 – 1,073,741,823	0 when uninitialized; multiple of 2K after initialization
Binary			
binary(n)		pagesize	*n*
varbinary(n)		pagesize	actual entry length
image		2^{31} -1 (2,147,483,647) bytes or fewer	0 when uninitialized; multiple of 2K after initialization
Bit			
bit		0 or 1	1 (one byte holds up to 8 bit columns)

Datatypes of columns, variables, or parameters

You must declare the datatype for a column, local variable, or parameter. The datatype can be any of the system-supplied datatypes, or any user-defined datatype in the database.

Declaring datatypes for a column in a table

To declare the datatype of a new column in a create table or alter table statement, use:

create table [[*database*.]*owner*.]*table_name*
    (*column_name datatype* [identity | not null | null]
        [, *column_name datatype* [identity | not null |
            null]]...)

alter table [[*database*.]*owner*.]*table_name*
    add *column_name datatype* [identity | null
    [, *column_name datatype* [identity | null]...

For example:

```
create table sales_daily
    (stor_id char(4)not null,
     ord_num numeric(10,0)identity,
     ord_amt money null)
```

You can also declare the datatype of a new column in a select into statement, use convert or cast:

```
select convert(double precision, x), cast ( int, y) into
    newtable from oldtable
```

Declaring datatypes for local variable in a batch or procedure

To declare the datatype for a local variable in a batch or stored procedure, use:

declare *@variable_name datatype*
    [, *@variable_name datatype*]...

For example:

```
declare @hope money
```

Declaring datatypes for a parameter in a stored procedure

Use the following syntax to declare the datatype for a parameter in a stored procedure:

create procedure [*owner*.]*procedure_name* [;*number*]
    [[(]@*parameter_name datatype* [= default] [output]
        [,@*parameter_name datatype* [= default]
            [output]]...[)]]
[with recompile]
as *SQL_statements*

For example:

```
create procedure auname_sp @auname varchar(40)
as
    select au_lname, title, au_ord
    from authors, titles, titleauthor
    where @auname = au_lname
    and authors.au_id = titleauthor.au_id
    and titles.title_id = titleauthor.title_id
```

Determining the datatype of numeric literals

Numeric literals entered with E notation are treated as float; all others are treated as exact numerics:

- Literals between 2^{31} - 1 and -2^{31} with no decimal point are treated as integer.
- Literals that include a decimal point, or that fall outside the range for integers, are treated as numeric.

Note To preserve backward compatibility, use E notation for numeric literals that should be treated as float.

Determining the datatype of character literals

In versions of Adaptive Server earlier than 12.5.1, when the client's character set was different from the server's character set, conversions were generally enabled to allow the text of SQL queries to be converted to the server's character set before being processed. If any character could not be converted because it could not be represented in the server's character set, the entire query was rejected. This character set "bottleneck" has been removed as of Adaptive Server version 12.5.1.

You cannot declare the datatype of a character literal. Adaptive Server treats character literals as varchar, except those that contain characters that cannot be converted to the server's default character set. Such literals are treated as univarchar. This makes it possible to perform such queries as selecting unichar data in a server configured for "iso_1" using a "sjis" (Japanese) client. For example:

```
select * from mytable where unichar_column = '五'
```

Since the character literal cannot be represented using the char datatype (in "iso_1"), it is promoted to the unichar datatype, and the query succeeds.

Datatypes of mixed-mode expressions

When you perform concatenation or mixed-mode arithmetic on values with different datatypes, Adaptive Server must determine the datatype, length, and precision of the result.

Determining the datatype hierarchy

Each system datatype has a **datatype hierarchy**, which is stored in the systypes system table. User-defined datatypes inherit the hierarchy of the system datatype on which they are based.

The following query ranks the datatypes in a database by hierarchy. In addition to the information shown below, your query results will include information about any user-defined datatypes in the database:

```
select name, hierarchy
    from systypes
    order by hierarchy
```

```
name           hierarchy
---------- ---------
floatn             1
float              2
datetimn           3
datetime           4
real               5
numericn           6
numeric            7
decimaln           8
decimal            9
moneyn            10
money             11
smallmoney        12
smalldatet        13
intn              14
uintn             15
bigint            16
ubigint           17
int               18
uint              19
smallint          20
usmallint         21
tinyint           22
bit               23
univarchar        24
unichar           25
unitext           26
sysname           27
varchar           27
nvarchar          27
longsysnam        27
char              28
```

```
nchar               28
timestamp           29
varbinary           29
binary              30
text                31
image               32
date                33
time                34
daten               35
timen               36
bigdatetime         37
bigtime             38
bigdatetimen        39
bigtimen            40
xml                 41
extended time       99
```

Note u<int_type> is an internal representation. The correct syntax for unsigned types is unsigned {int | integer | bigint | smallint }

The datatype hierarchy determines the results of computations using values of different datatypes. The result value is assigned the datatype that is closest to the top of the list or has the least hierarchical value.

In the following example, *qty* from the sales table is multiplied by royalty from the roysched table. qty is a smallint, which has a hierarchy of 20; royalty is an int, which has a hierarchy of 18. Therefore, the datatype of the result is an int:

```
smallint(qty) * int(royalty) = int
```

Determining precision and scale

For numeric and decimal datatypes, each combination of precision and scale is a distinct Adaptive Server datatype. If you perform arithmetic on two numeric or decimal values:

- *n1* with precision *p1* and scale *s1*, and
- *n2* with precision *p2* and scale *n2*

Adaptive Server determines the precision and scale of the results as shown in Table 1-3.

Table 1-3: Precision and scale after arithmetic operations

Operation	Precision	Scale
n1 + n2	max(s1, s2) + max(p1 -s1, p2 - s2) + 1	max(s1, s2)
n1 - n2	max(s1, s2) + max(p1 -s1, p2 - s2) + 1	max(s1, s2)
n1 * n2	s1 + s2 + (p1 - s1) + (p2 - s2) + 1	s1 + s2
n1 / n2	max(s1 + p2 + 1, 6) + p1 - s1 + p2	max(s1 + p2 -s2 + 1, 6)

Datatype conversions

Many conversions from one datatype to another are handled automatically by Adaptive Server. These are called implicit conversions. Other conversions must be performed explicitly with the convert, hextoint, inttohex, hextobigint, and biginttohex functions. See *Transact-SQL Users Guide* for details about datatype conversions supported by Adaptive Server.

Automatic conversion of fixed-length NULL columns

Only columns with variable-length datatypes can store null values. When you create a NULL column with a fixed-length datatype, Adaptive Server automatically converts it to the corresponding variable-length datatype. Adaptive Server does not inform the user of the datatype change.

Table 1-4 lists the fixed- and variable-length datatypes to which they are converted. Certain variable-length datatypes, such as moneyn, are reserved datatypes; you cannot use them to create columns, variables, or parameters:

Table 1-4: Automatic conversion of fixed-length datatypes

Original fixed-length datatype	Converted to
char	varchar
unichar	univarchar
nchar	nvarchar
binary	varbinary
datetime	datetimn
date	daten
time	timen
float	floatn
bigint, int, smallint, and tinyint	intn
unsigned bigint, unsigned int, and unsigned smallint	uintn
decimal	decimaln
numeric	numericn
money and smallmoney	moneyn

Handling overflow and truncation errors

The arithabort option determines how Adaptive Server behaves when an arithmetic error occurs. The two arithabort options, arithabort arith_overflow and arithabort numeric_truncation, handle different types of arithmetic errors. You can set each option independently, or set both options with a single set arithabort on or set arithabort off statement.

- arithabort arith_overflow specifies behavior following a divide-by-zero error or a loss of precision during either an explicit or an implicit datatype conversion. This type of error is considered serious. The default setting, arithabort arith_overflow on, rolls back the entire transaction in which the error occurs. If the error occurs in a batch that does not contain a transaction, arithabort arith_overflow on does not roll back earlier commands in the batch, but Adaptive Server does not execute any statements that follow the error-generating statement in the batch.

  Setting arith_overflow to on refers to the execution time, not to the level of normalization to which Adaptive Server is set.

  If you set arithabort arith_overflow off, Adaptive Server aborts the statement that causes the error, but continues to process other statements in the transaction or batch.

- arithabort numeric_truncation specifies behavior following a loss of scale by an exact numeric datatype during an implicit datatype conversion. (When an explicit conversion results in a loss of scale, the results are truncated without warning.) The default setting, arithabort numeric_truncation on, aborts the statement that causes the error but continues to process other statements in the transaction or batch. If you set arithabort numeric_truncation off, Adaptive Server truncates the query results and continues processing.

The arithignore option determines whether Adaptive Server prints a warning message after an overflow error. By default, the arithignore option is turned off. This causes Adaptive Server to display a warning message after any query that results in numeric overflow. To ignore overflow errors, use set arithignore on.

Standards and compliance

Table 1-5 lists the ANSI SQL standards and compliance levels for Transact-SQL datatypes.

Table 1-5: ANSI SQL standards and compliance levels for Transact-SQL datatypes

Transact-SQL – ANSI SQL Datatypes	Transact-SQL Extensions – User-Defined Datatypes
• char	• binary
• varchar	• varbinary
• smallint	• bit
• int	• nchar
• bigint	• datetime
• decimal	• smalldatetime
• numeric	• bigdatetime
• float	• bigtime
• real	• tinyint
• date	• unsigned smallint
• time	• unsigned int
• double precision	• unsigned bigint
	• money
	• smallmoney
	• text
	• unitext
	• image
	• nvarchar
	• unichar
	• univarchar
	• sysname
	• longsysname
	• timestamp

Exact numeric datatypes

Use the exact numeric datatypes when you must represent a value exactly. Adaptive Server provides exact numeric types for both integers (whole numbers) and numbers with a decimal portion.

Integer types

Adaptive Server provides the following exact numeric datatypes to store integers: bigint, int (or integer), smallint, tinyint and each of their unsigned counterparts. Choose the integer type based on the expected size of the numbers to be stored. Internal storage size varies by type, as shown in Table 1-6.

Table 1-6: Integer datatypes

Datatype	Stores	Bytes of Storage
bigint	Whole numbers between -2^{63} and 2^{63} - 1 (from -9,223,372,036,854,775,808 to +9,223,372,036,854,775,807, inclusive.	8
int[eger]	Whole numbers between-2^{31} and 2^{31} - 1 (-2,147,483,648 and 2,147,483,647), inclusive.	4
smallint	Whole numbers between -2^{15} and 2^{15} -1 (-32,768 and 32,767), inclusive.	2
tinyint	Whole numbers between 0 and 255, inclusive. (Negative numbers are not permitted.)	1
unsigned bigint	Whole numbers between 0 and 18,446,744,073,709,551,615	8
unsigned int	Whole numbers between 0 and 4,294,967,295	4
unsigned smallint	Whole numbers between 0 and 65,535	2

Entering integer data

Enter integer data as a string of digits without commas. Integer data can include a decimal point as long as all digits to the right of the decimal point are zeros. The smallint, integer, and bigint datatypes can be preceded by an optional plus or minus sign. The tinyint datatype can be preceded by an optional plus sign.

Table 1-7 shows some valid entries for a column with a datatype of integer and indicates how isql displays these values:

Table 1-7: Valid integer values

Value Entered	Value Displayed
2	2
+2	2
-2	-2
2.	2
2.000	2

Table 1-8 lists some invalid entries for an integer column:

Table 1-8: Invalid integer values

Value Entered	Type of Error
2,000	Commas not allowed.
2-	Minus sign should precede digits.
3.45	Digits to the right of the decimal point are nonzero digits.

Decimal datatypes

Adaptive Server provides two other exact numeric datatypes, numeric and dec[imal], for numbers that include decimal points. The numeric and decimal datatypes are identical in all respects but one: only numeric datatypes with a scale of 0 and integer datatypes can be used for the IDENTITY column.

Specifying precision and scale

The numeric and decimal datatypes accept two optional parameters, precision and scale, enclosed in parentheses and separated by a comma:

datatype [(*precision* [, *scale*])]

Adaptive Server treats each combination of precision and scale as a distinct datatype. For example, numeric(10,0) and numeric(5,0) are two separate datatypes. The precision and scale determine the range of values that can be stored in a decimal or numeric column:

- The precision specifies the maximum number of decimal digits that can be stored in the column. It includes *all* digits, both to the right and to the left of the decimal point. You can specify precisions ranging from 1 digit to 38 digits or use the default precision of 18 digits.
- The scale specifies the maximum number of digits that can be stored to the right of the decimal point. The scale must be less than or equal to the precision. You can specify a scale ranging from 0 digits to 38 digits, or use the default scale of 0 digits.

Storage size

The storage size for a numeric or decimal column depends on its precision. The minimum storage requirement is 2 bytes for a 1- or 2-digit column. Storage size increases by approximately 1 byte for each additional 2 digits of precision, up to a maximum of 17 bytes.

Use the following formula to calculate the exact storage size for a numeric or decimal column:

```
ceiling (precision / log10(256)) + 1
```

For example, the storage size for a numeric(18,4) column is 9 bytes.

Entering decimal data

Enter decimal and numeric data as a string of digits preceded by an optional plus or minus sign and including an optional decimal point. If the value exceeds either the precision or scale specified for the column, Adaptive Server returns an error message. Exact numeric types with a scale of 0 are displayed without a decimal point.

Table 1-9 shows some valid entries for a column with a datatype of numeric(5,3) and indicates how these values are displayed by isql:

Table 1-9: Valid decimal values

Value Entered	Value Eisplayed
12.345	12.345
+12.345	12.345
-12.345	-12.345
12.345000	12.345
12.1	12.100
12	12.000

Table 1-10 shows some invalid entries for a column with a datatype of numeric(5,3):

Table 1-10: Invalid decimal values

Value Entered	Type of Error
1,200	Commas not allowed.
12-	Minus sign should precede digits.
12.345678	Too many nonzero digits to the right of the decimal point.

Standards and compliance

Transact-SQL provides the smallint, int, bigint, numeric, and decimal ANSI SQL exact numeric datatypes. The unsigned bigint, unsigned int, unsigned smallint, and tinyint type is a Transact-SQL extension.

Approximate numeric datatypes

Use the approximate numeric types, float, double precision, and real, for numeric data that can tolerate rounding. The approximate numeric types are especially suited to data that covers a wide range of values. They support all aggregate functions and all arithmetic operations.

Understanding approximate numeric datatypes

Approximate numeric datatypes, used to store floating-point numbers, are inherently slightly inaccurate in their representation of real numbers—hence the name "approximate numeric." To use these datatypes, you must understand their limitations.

When a floating-point number is printed or displayed, the printed representation is not quite the same as the stored number, and the stored number is not quite the same as the number that the user entered. Most of the time, the stored representation is close enough, and software makes the printed output look just like the original input, but you must understand the inaccuracy if you plan to use floating-point numbers for calculations, particularly if you are doing repeated calculations using approximate numeric datatypes—the results can be surprisingly and unexpectedly inaccurate.

The inaccuracy occurs because floating-point numbers are stored in the computer as binary fractions (that is, as a representative number divided by a power of 2), but the numbers we use are decimal (powers of 10). This means that only a very small set of numbers can be stored accurately: 0.75 (3/4) can be stored accurately because it is a binary fraction (4 is a power of 2); 0.2 (2/10) cannot (10 is not a power of 2).

Some numbers contain too many digits to store accurately. double precision is stored as 8 binary bytes and can represent about 17 digits with reasonable accuracy. real is stored as 4 binary bytes and can represent only about 6 digits with reasonable accuracy.

If you begin with numbers that are almost correct, and perform computations with them using other numbers that are almost correct, you can easily end up with a result that is not even close to being correct. If these considerations are important to your application, use an exact numeric datatype.

Range, precision, and storage size

The real and double precision types are built on types supplied by the operating system. The float type accepts an optional binary precision in parentheses. float columns with a precision of 1–15 are stored as real; those with higher precision are stored as double precision.

The range and storage precision for all three types is machine-dependent.

Table 1-11 shows the range and storage size for each approximate numeric type. isql displays only 6 significant digits after the decimal point and rounds the remainder:

Table 1-11: Approximate numeric datatypes

Datatype	Bytes of Storage
float[(default precision)]	4 for default precision < 16 8 for default precision >= 16
double precision	8
real	4

Entering approximate numeric data

Enter approximate numeric data as a mantissa followed by an optional exponent:

- The mantissa is a signed or unsigned number, with or without a decimal point. The column's binary precision determines the maximum number of binary digits allowed in the mantissa.
- The exponent, which begins with the character "e" or "E," must be a whole number.

The value represented by the entry is the following product:

```
mantissa * 10EXPONENT
```

For example, 2.4E3 represents the value 2.4 times 10^3, or 2400.

NaN and Inf values

"NaN" and "Inf" are special values that the IEEE754/854 floating point number standards use to represent values that are "not a number" and "infinity," respectively. In accordance with the ANSI SQL92 standard, Adaptive Server versions 12.5 and later do not allow the insertion of these values in the database and do not allow them to be generated. In Adaptive Server versions earlier than 12.5, Open Client clients such as native-mode bcp, JDBC, and ODBC could occasionally force these values into tables.

If you encounter a NaN or an Inf value in the database, contact Sybase Customer Support with details of how to reproduce the problem.

Standards and compliance

ANSI SQL – Compliance level: The float, double precision, and real datatypes are entry-level compliant.

Money datatypes

Use the money and smallmoney datatypes to store monetary data. You can use these types for U.S. dollars and other decimal currencies, but Adaptive Server provides no means to convert from one currency to another. You can use all arithmetic operations except modulo, and all aggregate functions, with money and smallmoney data.

Accuracy

Both money and smallmoney are accurate to one ten-thousandth of a monetary unit, but they round values up to two decimal places for display purposes. The default print format places a comma after every three digits.

Range and storage size

Table 1-12 summarizes the range and storage requirements for money datatypes:

Table 1-12: Money datatypes

Datatype	Range	Bytes of Storage
money	Monetary values between +922,337,203,685,477.5807 and -922,337,203,685,477.5808	8
smallmoney	Monetary values between +214,748.3647 and -214,748.3648	4

Entering monetary values

Monetary values entered with E notation are interpreted as float. This may cause an entry to be rejected or to lose some of its precision when it is stored as a money or smallmoney value.

money and smallmoney values can be entered with or without a preceding currency symbol, such as the dollar sign ($), yen sign (¥), or pound sterling sign (£). To enter a negative value, place the minus sign after the currency symbol. Do not include commas in your entry.

Standards and compliance

ANSI SQL – The money and smallmoney datatypes are Transact-SQL extensions.

Timestamp datatype

Use the user-defined timestamp datatype in tables that are to be browsed in Client-Library™ applications (see “Browse Mode” for more information). Adaptive Server updates the timestamp column each time its row is modified. A table can have only one column of timestamp datatype.

Creating a *timestamp* column

If you create a column named timestamp without specifying a datatype, Adaptive Server defines the column as a timestamp datatype:

```
create table testing
    (c1 int, timestamp, c2 int)
```

You can also explicitly assign the timestamp datatype to a column named timestamp:

```
create table testing
    (c1 int, timestamp timestamp, c2 int)
```

or to a column with another name:

```
create table testing
    (c1 int, t_stamp timestamp,c2 int)
```

You can create a column named timestamp and assign it another datatype (although this may be confusing to other users and does not allow the use of the browse functions in Open Client™ or with the tsequal function):

```
create table testing
    (c1 int, timestamp datetime)
```

Date and time datatypes

Use datetime, smalldatetime, bigdatetime, bigtime, date, and time to store absolute date and time information. Use timestamp to store binary-type information.

Adaptive Server has various datatypes used to store date and time values.

- date
- time
- smalldatetime
- datetime
- bigdatetime
- bigtime

The default display format for dates is “Apr 15 1987 10:23PM”. bigdatetime/bigtime types have a default display format of “Apr 15 1987 10:23:00.000000PM” You can use the convert function for other styles of date display. You can also perform some arithmetic calculations on date and time values with the built-in date functions, though Adaptive Server may round or truncate millisecond values.

- datetime columns hold dates between January 1, 1753 and December 31, 9999. datetime values are accurate to 1/300 second on platforms that support this level of granularity. The last digit of the fractional second is always 0, 3, or 6. Other digits are rounded to one of these three digits, so 0 and 1 round to 0; 2, 3, and 4 round to 3; 5, 6, 7, and 8 round to 6; and 9 rounds to 10.. Storage size is 8 bytes: 4 bytes for the number of days since the base date of January 1, 1900 and 4 bytes for the time of day.
- smalldatetime columns hold dates from January 1, 1900 to June 6, 2079, with accuracy to the minute. Its storage size is 4 bytes: 2 bytes for the number of days after January 1, 1900, and 2 bytes for the number of minutes after midnight.
- bigdatetime columns hold dates from January 1, 0001 to December 31, 9999 and 12:00:00.000000 AM to 11:59:59.999999 PM. Its storage size is 8 bytes. The internal representation of bigdatetime is a 64 bit integer containing the number of microseconds since 01/01/0000.
- bigtime columns hold times from 12:00:00.000000 AM to 11:59:59.999999 PM. Its storage size is 8 bytes. The internal representation of bigtime is a 64 bit integer containing the number of microseconds since midnight.
- date columns hold dates from January 1, 0001 to December 31, 9999. Storage size is 4 bytes.
- time is between 00:00:00:000 and 23:59:59:990. time values are accurate to 1/300 second. The last digit of the fractional second is always 0, 3, or 6. Other digits are rounded to one of these three digits, so 0 and 1 round to 0; 2, 3, and 4 round to 3; 5, 6, 7, and 8 round to 6; and 9 rounds to 10.You can use either military time or 12AM for noon and 12PM for midnight. A time value must contain either a colon or the AM or PM signifier. AM or PM may be in either uppercase or lowercase.

When entering date and time information, always enclose the time or date in single or double quotes.

Range and storage requirements

Table 1-13 summarizes the range and storage requirements for the datetime, smalldatetime, bigdatetime, bigtime, date, and time datatypes:

Table 1-13: Transact-SQL datatypes for storing dates and times

Datatype	Range	Bytes of Storage
datetime	January 1, 1753 through December 31, 9999	8
smalldatetime	January 1, 1900 through June 6, 2079	4
bigdatetime	January 1, 0001 to December 31, 9999	8
bigtime	12:00:00.000000AM to 11:59:59.999999PM	8
date	January 1, 0001 to December 31, 9999	4
time	12:00:00 AM to 11:59:59:990 PM	4

Entering date and time data

The datetime, smalldatetime, bigdatetime and bigtime datatypes consist of a date portion either followed by or preceded by a time portion. (You can omit either the date or the time, or both.) The date datatype has only a date and the time datatype has only the time. You must enclose values in single or double quotes.

Entering the date

Dates consist of a month, day, and year and can be entered in a variety of formats for date, datetime, bigdatetime, bigtime and smalldatetime:

- You can enter the entire date as an unseparated string of 4, 6, or 8 digits, or use slash (/), hyphen (-), or period (.) separators between the date parts.
    - When entering dates as unseparated strings, use the appropriate format for that string length. Use leading zeros for single-digit years, months, and days. Dates entered in the wrong format may be misinterpreted or result in errors.
    - When entering dates with separators, use the set dateformat option to determine the expected order of date parts. If the first date part in a separated string is four digits, Adaptive Server interprets the string as *yyyy-mm-dd* format.
- Some date formats accept 2-digit years (*yy*):
    - Numbers less than 50 are interpreted as 20*yy*. For example, `01` is 2001, `32` is 2032, and `49` is 2049.
    - Numbers equal to or greater than 50 are interpreted as 19*yy*. For example, `50` is 1950, `74` is 1974, and `99` is 1999.
- You can specify the month as either a number or a name. Month names and their abbreviations are language-specific and can be entered in uppercase, lowercase, or mixed case.

- If you omit the date portion of a datetime or smalldatetime value, Adaptive Server uses the default date of January 1, 1900. If you omit the date portion of a bigdatetime a default value of January 1, 0001 will be added.

Table 1-14 describes the acceptable formats for entering the date portion of a datetime or smalldatetime value:

Table 1-14: Date formats for date and time datatypes

Date Format	Interpretation	Sample Entries	Meaning
4-digit string with no separators	Interpreted as *yyyy*. Date defaults to Jan 1 of the specified year.	"1947"	Jan 1 1947
6-digit string with no separators	Interpreted as *yymmdd*. For *yy* < 50, year is 20*yy*. For *yy* >= 50, year is 19*yy*.	"450128" "520128"	Jan 28 2045 Jan 28 1952
8-digit string with no separators	Interpreted as *yyyymmdd*.	"19940415"	Apr 15 1994
String consisting of 2-digit month, day, and year separated by slashes, hyphens, or periods, or a combination of the above	The dateformat and language set options determine the expected order of date parts. For us_english, the default order is *mdy*. For *yy* < 50, year is interpreted as 20*yy*. For *yy* >= 50, year is interpreted as 19*yy*.	"4/15/94" "4.15.94" "4-15-94" "04.15/94"	All of these entries are interpreted as Apr 15 1994 when the dateformat option is set to mdy.
String consisting of 2-digit month, 2-digit day, and 4-digit year separated by slashes, hyphens, or periods, or a combination of the above	The dateformat and language set options determine the expected order of date parts. For us_english, the default order is *mdy*.	"04/15.1994"	Interpreted as Apr 15 1994 when the dateformat option is set to mdy.
Month is entered in character form (either full month name or its standard abbreviation), followed by an optional comma	If 4-digit year is entered, date parts can be entered in any order.	"April 15, 1994" "1994 15 apr" "1994 April 15" "15 APR 1994"	All of these entries are interpreted as Apr 15 1994.
	If day is omitted, all 4 digits of year must be specified. Day defaults to the first day of the month.	"apr 1994"	Apr 1 1994
	If year is only 2 digits (*yy*), it is expected to appear after the day. For *yy* < 50, year is interpreted as 20*yy*. For *yy* >= 50, year is interpreted as 19*yy*.	"mar 16 17" "apr 15 94"	Mar 16 2017 Apr 15 1994
The empty string ""	Date defaults to Jan 1 1900.	""	Jan 1 1900

Entering the time

The time component of a datetime, smalldatetime, or time value must be specified as follows:

```
hours[:minutes[:seconds[:milliseconds]] [AM | PM]
```

The time component of a bigdatetime or bigtime value must be specified as follows:

```
hours[:minutes[:seconds[.microseconds]] [AM | PM]
```

- Use 12AM for midnight and 12PM for noon.
- A time value must contain either a colon or an AM or PM signifier. The AM or PM can be entered in uppercase, lowercase, or mixed case.
- The seconds specification can include either a decimal portion preceded by a decimal point, or a number of milliseconds preceded by a colon. For example, "15:30:20:1" means twenty seconds and one millisecond past 3:30 PM; "15:30:20.1" means twenty and one-tenth of a second past 3:30 PM. Microseconds must be expressed with a decimal point.
- If you omit the time portion of a datetime or smalldatetime value, Adaptive Server uses the default time of 12:00:00:000AM.

Displaying formats for *datetime*, *smalldatetime*, and *date* values

The display format for datetime and smalldatetime values is "Mon dd yyyy hh:mmAM" (or "PM"); for example, "Apr 15 1988 10:23PM". To display seconds and milliseconds, and to obtain additional date styles and date-part orders, use the convert function to convert the data to a character string. Adaptive Server may round or truncate millisecond values.

Table 1-15 lists some examples of datetime entries and their display values:

Table 1-15: Examples of datetime and date entries

Entry	Value displayed
“1947”	Jan 1 1947 12:00AM
“450128 12:30:1PM”	Jan 28 2045 12:30PM
“12:30.1PM 450128”	Jan 28 2045 12:30PM
“14:30.22”	Jan 1 1900 2:30PM
“4am”	Jan 1 1900 4:00AM
Examples of date	
“1947”	Jan 1 1947
“450128”	Jan 28 2045
“520317”	Mar 17 1952

Display formats for bigdatetime and bigtime

For bigdatetime and bigtime the value displays reflects a microsecond value. bigdatetime and bigtime have default display formats that accomodate their increased precision.

- hh:mm:ss.zzzzzzAM or PM
- hh:mm:ss.zzzzzz
- mon dd yyyy
hh:mm:ss.zzzzzzAM(PM)
- mon dd yyyy
hh:mm:ss.zzzzzz
- yyyy-mm-dd
hh:mm:ss.zzzzzz

The format for time must be specified as:

```
hours[:minutes[:seconds[.microseconds]] [AM | PM]
hours[:minutes[:seconds[number of milliseconds]] [AM | PM]
```

Use 12 AM for midnight and 12 PM for noon. A bigtime value must contain either a colon or an AM or PM signifier. AM or PM can be entered in uppercase, lowercase, or mixed case.

The seconds specification can include either a decimal portion preceded by a point or a number of milliseconds preceded by a colon. For example, “12:30:20:1” means twenty seconds and one millisecond past 12:30; “12:30:20.1” means twenty and one-tenth of a second past.

To store a bigdatetime or bigtime time value that includes microseconds, specify a string literal using a point. “00:00:00.1” means one tenth of a second past midnight and “00:00:00.000001” means one millionth of a second past midnight. Any value after the colon specifying fractional seconds will continue to refer to a number of milliseconds. Such as “00:00:00:5” means 5 milliseconds.

Displaying formats for *time* value

The display format for time values is “hh:mm:ss:mmmAM” (or “PM”); for example, “10:23:40:022PM.

Table 1-16: Examples of time entries

Entry	Value displayed
"12:12:00”	12:12PM
“01:23PM” or “01:23:1PM”	1:23PM
“02:24:00:001”	2:24AM

Finding values that match a pattern

Use the like keyword to look for dates that match a particular pattern. If you use the equality operator (=) to search date or time values for a particular month, day, and year, Adaptive Server returns only those values for which the time is precisely 12:00:00:000AM.

For example, if you insert the value “9:20” into a column named arrival_time, Adaptive Server converts the entry into “Jan 1 1900 9:20AM.” If you look for this entry using the equality operator, it is not found:

```
where arrival_time = "9:20" /* does not match */
```

You can find the entry using the like operator:

```
where arrival_time like "%9:20%"
```

When using like, Adaptive Server first converts the dates to datetime or date format and then to varchar. The display format consists of the 3-character month in the current language, 2 characters for the day, 4 characters for the year, the time in hours and minutes, and “AM” or “PM.”

When searching with like, you cannot use the wide variety of input formats that are available for entering the date portion of datetime, smalldatetime, bigdatetime, bigtime, date, and time values. You cannot search for seconds or milliseconds with like and match a pattern, unless you are also using *style* 9 or 109 and the convert function.

If you are using like, and the day of the month is a number between 1 and 9, insert 2 spaces between the month and the day to match the varchar conversion of the datetime value. Similarly, if the hour is less than 10, the conversion places 2 spaces between the year and the hour. The following clause with 1 space between "May" and "2") finds all dates from May 20 through May 29, but not May 2:

```
like "May 2%"
```

You do not need to insert the extra space with other date comparisons, only with like, since the datetime values are converted to varchar only for the like comparison.

Manipulating dates

You can do some arithmetic calculations on date and time datatypes values with the built-in date functions. See *Transact-SQL Users Guide*.

Standards and compliance

ANSI SQL – Compliance level: The datetime and smalldatetime datatypes are Transact-SQL extensions. date and time datatypes are entry-level compliant.

Character datatypes

Which datatype you use for a situation depends on the type of data you are storing:

- Use the character datatypes to store strings consisting of letters, numbers, and symbols.
- Use varchar(n) and char(n) for both single-byte character sets such as us_english and for multibyte character sets such as Japanese.
- Use the unichar(n) and univarchar(n) datatypes to store Unicode characters. They are useful for single-byte or multibyte characters when you need a fixed number of bytes per character.
- Use the fixed-length datatype, nchar(n) , and the variable-length datatype, nvarchar(n), for both single-byte and multibyte character sets, such as Japanese. The difference between nchar(n) and char(n) and nvarchar(n) and varchar(n) is that both nchar(n) and nvarchar(n) allocate storage based on *n* times the number of bytes per character (based on the default character set). char(n) and varchar(n) allocate *n* bytes of storage.

- Character datatypes can store a maximum of a page size worth of data
- Use the text datatype (described in "text, image, and unitext datatypes" on page 36)—or multiple rows in a subtable—for strings longer than the char or varchar dataype allow.

unichar, *univarchar*

You can use the unichar and univarchar datatypes anywhere that you can use char and varchar character datatypes, without having to make syntax changes.

In Adaptive Server version 12.5.1 and later, queries containing character literals that cannot be represented in the server's character set are automatically promoted to the unichar datatype so you do not have to make syntax changes for data manipulation language (DML) statements. Additional syntax is available for specifying arbitrary characters in character literals, but the decision to "promote" a literal to unichar is based solely on representability.

With data definition language (DDL) statements, the syntax changes required are minimal. For example, in the create table command, the size of a Unicode column is specified in units of 16-bit Unicode values, not bytes, thereby maintaining the similarity between char(200) and unichar(200). sp_help, which reports on the lengths of columns, uses the same units. The multiplication factor (2) is stored in the new global variable *@@unicharsize*.

See Chapter 8, "Configuring Character Sets, Sort Orders, and Languages," in the *System Administration Guide* for more information about Unicode.

Length and storage size

Character variables strip the trailing spaces from strings when the variable is populated in a varchar column of a cursor.

Use *n* to specify the number of bytes of storage for char and varchar datatypes. For unichar, use *n* to specify the number of Unicode characters (the amount of storage allocated is 2 bytes per character). For nchar and nvarchar, *n* is the number of characters (the amount of storage allocated is *n* times the number of bytes per characer for the server's current default character set).

If you do not use *n* to specify the length:

- The default length is 1 byte for columns created with create table, alter table, and variables created with declare.

- The default length is 30 bytes for values created with the convert function.

Entries shorter than the assigned length are blank-padded; entries longer than the assigned length are truncated without warning, unless the string_rtruncation option to the set command is set to on. Fixed-length columns that allow nulls are internally converted to variable-length columns.

Use *n* to specify the maximum length in characters for the variable-length datatypes, varchar(n), univarchar(n), and nvarchar(n). Data in variable-length columns is stripped of trailing blanks; storage size is the actual length of the data entered. Data in variable-length variables and parameters retains all trailing blanks, but is not padded to the defined length. Character literals are treated as variable-length datatypes.

Fixed-length columns tend to take more storage space than variable-length columns, but are accessed somewhat faster. Table 1-17 summarizes the storage requirements of the different character datatypes:

Table 1-17: Character datatypes

Datatype	Stores	Bytes of Storage
char(n)	Character	*n*
unichar(n)	Unicode character	*n*@@unicharsize* (*@@unicharsize* equals 2)
nchar(n)	National character	*n * @@ncharsize*
varchar(n)	Character varying	Actual number of characters entered
univarchar(n)	Unicode character varying	Actual number of characters * *@@unicharsize*
nvarchar(n)	National character varying	Actual number of characters * *@@ncharsize*

Determining column length with system functions

Use the char_length string function and datalength system function to determine column length:

- char_length returns the number of characters in the column, stripping trailing blanks for variable-length datatypes.
- datalength returns the number of bytes, stripping trailing blanks for data stored in variable-length columns.

When a char value is declared to allow NULL values, Adaptive Server stores it internally as a varchar.

If the min or max aggregate functions are used on a char column, the result returned is varchar, and is therefore stripped of all trailing spaces.

Entering character data

Character strings must be enclosed in single or double quotes. If you use set quoted_identifier on, use single quotes for character strings; otherwise, Adaptive Server treats them as identifiers.

Strings that include the double-quote character should be surrounded by single quotes. Strings that include the single-quote character should be surrounded by double quotes. For example:

```
'George said, "There must be a better way."'
"Isn't there a better way?"
```

An alternative is to enter two quotation marks for each quotation mark you want to include in the string. For example:

```
"George said, ""There must be a better way."""
'Isn''t there a better way?'
```

To continue a character string onto the next line of your screen, enter a backslash (\) before going to the next line.

For more information about quoted identifiers, see the section "Delimited identifiers"of the *Transact SQL User's Guide*.

Entering Unicode characters

Optional syntax allows you to specify arbitrary Unicode characters. If a character literal is immediately preceded by U& or u& (with no intervening white space), the parser recognizes escape sequences within the literal. An escape sequence of the form \xxxx (where xxxx represents four hexadecimal digits) is replaced with the Unicode character whose scalar value is xxxx. Similarly, an escape sequence of the form \+yyyyyy is replaced with the Unicode character whose scalar value is yyyyyy. The escape sequence \\ is replaced by a single \. For example, the following is equivalent to:

```
select * from mytable where unichar_column = '五'
```

```
select * from mytable where unichar_column = U&'\4e94'
```

The U& or u& prefix simply enables the recognition of escapes. The datatype of the literal is chosen solely on the basis of representability. Thus, for example, the following two queries are equivalent:

```
select * from mytable where char_column = 'A'

select * from mytable where char_column = U&'\0041'
```

In both cases, the datatype of the character literal is char, since “A” is an ASCII character, and ASCII is a subset of all Sybase-supported server character sets.

The U& and u& prefixes also work with the double-quoted character literals and for quoted identifiers. However, quoted identifiers must be representable in the server’s character set, insofar as all database objects are identified by names in system tables, and all such names are of datatype char.

Treatment of blanks

The following example creates a table named spaces that has both fixed- and variable-length character columns:

```
create table spaces (cnot char(5) not null,
    cnull char(5) null,
    vnot varchar(5) not null,
        vnull varchar(5) null,
    explanation varchar(25) not null)

insert spaces values ("a", "b", "c", "d", "pads char-not-null only")
insert spaces values ("1    ", "2    ", "3    ", "4    ", "truncates trailing blanks")
insert spaces values ("    e", "    f", "    g", "    h", "leading blanks, no change")
insert spaces values ("   w ", "   x ", "   y ", "    z ", "truncates trailing blanks")
insert spaces values ("", "", "", "", "empty string equals space")

select "[" + cnot + "]",
       "[" + cnull + "]",
       "[" + vnot + "]",
       "[" + vnull + "]",
    explanation from spaces

                                   explanation
 -------  -------  ------- ------- --------------------
 [a    ]  [b]      [c]      [d]     pads char-not-null only
 [1    ]  [2]      [3]      [4]     truncates trailing blanks
 [    e]  [    f]  [    g]  [    h]  leading blanks, no change
 [   w ]  [   x]  [   y]  [   z]  truncates trailing blanks
 [ ]      [ ]      [ ]      [ ]     empty string equals space

(5 rows affected)
```

This example illustrates how the column’s datatype and null type interact to determine how blank spaces are treated:

- Only char not null and nchar not null columns are padded to the full width of the column; char null columns are treated like varchar and nchar null columns are treated like nvarchar.

- Only unichar not null columns are padded to the full width of the column; unichar null columns are treated like univarchar.
- Preceding blanks are not affected.
- Trailing blanks are truncated except for char, unichar, and nchar not null columns.
- The empty string (“ ”) is treated as a single space. In char, nchar, and unichar not null columns, the result is a column-length field of spaces.

Manipulating character data

You can use the like keyword to search character strings for particular characters and the built-in string functions to manipulate their contents. You can use strings consisting of numbers for arithmetic after being converted to exact and approximate numeric datatypes with the convert function.

Standards and compliance

ANSI SQL – Compliance level: Transact-SQL provides the char and varchar ANSI SQL datatypes. The nchar, nvarchar, unichar, and univarchar datatypes are Transact-SQL extensions.

Binary datatypes

Use the binary datatypes, binary(n) and varbinary(n), to store raw binary data, such as pictures, in a raw binary notation, up to the maximum column size for your server’s logical page size.

Valid *binary* and *varbinary* entries

Binary data begins with the characters “0x” and can include any combination of digits, and the uppercase and lowercase letters A through F.

Use *n* to specify the column length in bytes, or use the default length of 1 byte. Each byte stores 2 binary digits. If you enter a value longer than *n*, Adaptive Server truncates the entry to the specified length without warning or error.

Use the fixed-length binary type, binary(n), for data in which all entries are expected to be approximately equal in length.

Use the variable-length binary type, varbinary(n), for data that is expected to vary greatly in length.

Because entries in binary columns are zero-padded to the column length (*n*), they may require more storage space than those in varbinary columns, but they are accessed somewhat faster.

If you do not use *n* to specify the length:

- The default length is 1 byte for columns created with create table, alter table, and variables created with declare.
- The default length is 30 bytes for values created with the convert function.

Entries of more than the maximum column size

Use the image datatype to store larger blocks of binary data (up to 2,147,483,647 bytes) on external data pages. You cannot use the image datatype for variables or for parameters in stored procedures. For more information, see "text, image, and unitext datatypes" on page 36.

Treatment of trailing zeros

All binary not null columns are padded with zeros to the full width of the column. Trailing zeros are truncated in all varbinary data and in binary null columns, since columns that accept null values must be treated as variable-length columns.

The following example creates a table with all four variations of binary and varbinary datatypes, NULL, and NOT NULL. The same data is inserted in all four columns and is padded or truncated according to the datatype of the column.

```
create table zeros (bnot binary(5) not null,
            bnull binary(5) null,
            vnot varbinary(5) not null,
            vnull varbinary(5) null)

insert zeros values (0x12345000, 0x12345000, 0x12345000, 0x12345000)
insert zeros values (0x123, 0x123, 0x123, 0x123)
```

```
select * from zeros

bnot              bnull        vnot         vnull
------------      ---------    ----------   ---------
0x1234500000      0x123450     0x123450     0x123450
0x0123000000      0x0123       0x0123       0x0123
```

Because each byte of storage holds 2 binary digits, Adaptive Server expects binary entries to consist of the characters “0x” followed by an even number of digits. When the “0x” is followed by an odd number of digits, Adaptive Server assumes that you omitted the leading 0 and adds it for you.

Input values “0x00” and “0x0” are stored as “0x00” in variable-length binary columns (binary null, image, and varbinary columns). In fixed-length binary (binary not null) columns, the value is padded with zeros to the full length of the field:

```
insert zeros values (0x0, 0x0,0x0, 0x0)
select * from zeros where bnot = 0x00

bnot            bnull       vnot        vnull
----------      ------      -----       ------------
0x0000000000    0x00        0x00        0x00
```

If the input value does not include the “0x”, Adaptive Server assumes that the value is an ASCII value and converts it. For example:

```
create table sample (col_a binary(8))

insert sample values ('002710000000ae1b')

select * from sample
col_a
------------------
0x3030323731303030
```

Platform dependence

The exact form in which you enter a particular value depends upon the platform you are using. Therefore, calculations involving binary data can produce different results on different machines.

You cannot use the aggregate functions sum or avg with the binary datatypes.

For platform-independent conversions between hexadecimal strings and integers, use the inttohex and hextoint functions rather than the platform-specific convert function. For details, see *Transact-SQL Users Guide*.

Standards and compliance

ANSI SQL – Compliance level: The binary and varbinary datatypes are Transact-SQL extensions.

bit datatype

Use the bit datatype for columns that contain true/false and yes/no types of data. The status column in the syscolumns system table indicates the unique offset position for bit datatype columns.

bit columns hold either 0 or 1. Integer values other than 0 or 1 are accepted, but are always interpreted as 1.

Storage size is 1 byte. Multiple bit datatypes in a table are collected into bytes. For example, 7 bit columns fit into 1 byte; 9 bit columns take 2 bytes.

Columns with a datatype of bit cannot be NULL and cannot have indexes on them.

Standards and compliance

ANSI SQL – Compliance level: Transact-SQL extension.

sysname and *longsysname* datatypes

sysname and longsysname are user-defined datatypes that are distributed on the Adaptive Server installation media and used in the system tables. The definitions are:

- sysname – varchar(30) "not null"

- longsysname – varchar(255) "not null"

You can declare a column, parameter, or variable to be of types sysname and longsysname. Alternately, you can also create a user-defined datatype with a base type of sysname and longsysname, and then define columns, parameters, and variables with the user-defined datatype.

Standards and compliance

ANSI SQL – Compliance level: All user-defined datatypes, including sysname and longsysname, are Transact-SQL extensions.

text, *image*, and *unitext* datatypes

text columns are variable-length columns that can hold up to 2,147,483,647 (2^{31} - 1) bytes of printable characters.

The variable-length unitext datatype can hold up to 1,073,741,823 Unicode characters (2,147,483,646 bytes).

image columns are variable-length columns that can hold up to 2,147,483,647 (2^{31} - 1) bytes of raw binary data.

A key distinction between text and image is that text is subject to character-set conversion if you are not using the default character set of Adaptive Server default. image is not subject to character-set conversion.

Define a text, unitext, or image column as you would any other column, with a create table or alter table statement. text, unitext, or image datatype definitions do not include lengths. text, unitext, and image columns do permit null values. Their column definition takes the form:

column_name {text | image | unitext} [null]

For example, the create table statement for the author's blurbs table in the pubs2 database with a text column, blurb, that permits null values, is:

```
create table blurbs
(au_id id not null,
copy text null)
```

This example creates a unitext column that allows null values:

```
create table tb (ut unitext null)
```

To create the au_pix table in the pubs2 database with an image column:

```
create table au_pix
(au_id          char(11) not null,
pic             image null,
format_type     char(11) null,
bytesize        int null,
pixwidth_hor    char(14) null,
pixwidth_vert   char(14) null)
```

Adaptive Server stores text, unitext, and image data in a linked list of data pages that are separate from the rest of the table. Each text, unitext, or image page stores one logical page size worth of data (2, 4, 8, or 16K). All text, unitext, and image data for a table is stored in a single page chain, regardless of the number of text, unitext, and image columns the table contains.

You can place subsequent allocations for text, unitext, and image data pages on a different logical device with sp_placeobject.

image values that have an odd number of hexadecimal digits are padded with a leading zero (an insert of "0xaaabb" becomes "0x0aaabb").

You can use the partition option of the alter table command to partition a table that contains text, unitext, and image columns. Partitioning the table creates additional page chains for the other columns in the table, but has *no* effect on the way the text, unitext, and image columns are stored.

You can use unitext anywhere you use the text datatype, with the same semantics. unitext columns are stored in UTF-16 encoding, regardless of the Adaptive Server default character set.

Data structures used for storing *text*, *unitext*, and *image* data

When you allocate text, unitext, or image data, a 16-byte text pointer is inserted into the row you allocated. Part of this text pointer refers to a text page number at the head of the text, unitext, or image data. This text pointer is known as the first text page.

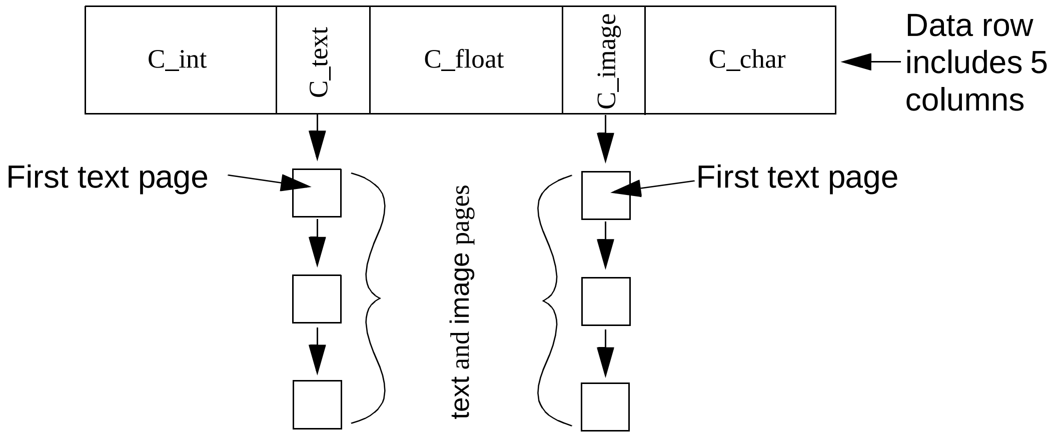
The first text page contains two parts:

- The text data page chain, which contains the text and image data and is a double-linked list of text pages
- The optional text-node structure, which is used to access the user text data

Once an first text page is allocated for text, unitext, or image data, it is never deallocated. If an update to an existing text, unitext,or image data row results in fewer text pages than are currently allocated for this text, unitext, or image data, Adaptive Server deallocates the extra text pages. If an update to text, unitext, or image data sets the value to NULL, all pages except the first text page are deallocated.

Figure 1-1 shows the relationship between the data row and the text pages.

Figure 1-1: Relationship between the text pointer and data rows



In Figure 1-1, columns c_text and c_image are text and image columns containing the pages at the bottom of the picture.

Initializing *text*, *unitext*, and *image* columns

text, unitext, and image columns are not initialized until you update them or insert a non-null value. Initialization allocates at least one data page for each non-null text, unitext, or image data value. It also creates a pointer in the table to the location of the text, unitext, or image data.

For example, the following statements create the table testtext and initialize the blurb column by inserting a non-null value. The column now has a valid text pointer, and the first text page has been allocated.

```
create table texttest
(title_id varchar(6), blurb text null, pub_id char(4))

insert texttest values
("BU7832", "Straight Talk About Computers is an
```

```
annotated analysis of what computers can do for you: a
no-hype guide for the critical user.", "1389")
```

The following statements create a table for image values and initialize the image column:

```
create table imagetest
(image_id varchar(6), imagecol image null, graphic_id
char(4))
insert imagetest values
("94732", 0x0000008300000000000100000000013c, "1389")
```

Note Surround text values with quotation marks and precede image values with the characters “0x”.

For information on inserting and updating text, unitext, and image data with Client-Library programs, see the *Client-Library/C Reference Manual*.

Defining unitext columns

You can define a unitext column the same way you define other datatypes, using create table or alter table statements. You do not define the length of a unitext column, and the column can be null.

This example creates a unitext column that allows null values:

```
create table tb (ut unitext null)
```

default unicode sort order defines the sort order for unitext columns for pattern matching in like clauses and in the patindex function, this is independent of the Adaptive Server default sort order.

Saving space by allowing NULL

To save storage space for empty text, unitext, or image columns, define them to permit null values and insert nulls until you use the column. Inserting a null value does not initialize a text, unitext, or image column and, therefore, does not create a text pointer or allocate storage. For example, the following statement inserts values into the title_id and pub_id columns of the testtext table created above, but does not initialize the blurb text column:

```
insert texttest
(title_id, pub_id) values ("BU7832", "1389")
```

Getting information from *sysindexes*

Each table with text, unitext, or image columns has an additional row in sysindexes that provides information about these columns. The name column in sysindexes uses the form "tablename." The indid is always 255. These columns provide information about text storage:

Table 1-18: Storage of text and image data

Column	Description
ioampg	Pointer to the allocation page for the text page chain
first	Pointer to the first page of text data
root	Pointer to the last page
segment	Number of the segment where the object resides

You can query the sysindexes table for information about these columns. For example, the following query reports the number of data pages used by the blurbs table in the pubs2 database:

```
select name, data_pages(db_id(), object_id("blurbs"), indid)
    from sysindexes
    where name = "tblurbs"
```

Note The system tables poster shows a one-to-one relationship between sysindexes and systabstats. This is correct, except for text and image columns, for which information is not kept in systabstats.

Using *readtext* and *writetext*

Before you can use writetext to enter text data or readtext to read it, you must initialize the text column. For details, see readtext and writetext in *Reference Manual: Commands*.

Using update to replace existing text, unitext, and image data with NULL reclaims all allocated data pages except the first page, which remains available for future use of writetext. To deallocate all storage for the row, use delete to remove the entire row.

There are restrictions for using readtext and writetext on a column defined for unitext. For more information see the "Usage" sections under readtext and writetext in the *Reference Manual: Commands*.

Determining how much space a column uses

sp_spaceused provides information about the space used for text data as index_size:

```
sp_spaceused blurbs
name            rowtotal  reserved  data    index_size unused
--------------- --------  --------- ------- ---------- ------
blurbs          6         32 KB     2 KB    14 KB      16 KB
```

Restrictions on *text*, *image*, and *unitext* columns

You cannot use text, image, or unitext columns:

- In order by, compute, group by, and union clauses
- In an index
- In subqueries or joins
- In a where clause, except with the keyword like

In triggers, both the inserted and deleted text values reference the new value; you cannot reference the old value.

Selecting *text*, *unitext*, and *image* data

The following global variables return information on text, unitext, and image data:

Table 1-19: text , unitext, and image global variables

Variable	Explanation
@@textptr	The text pointer of the last text, unitext, or image column inserted or updated by a process. Do not confuse this global variable with the textptr function.
@@textcolid	ID of the column referenced by *@@textptr*.
@@textdbid	ID of a database containing the object with the column referenced by *@@textptr*.
@@textobjid	ID of the object containing the column referenced by *@@textptr*.
@@textsize	Current value of the set textsize option, which specifies the maximum length, in bytes, of text, unitext, or image data to be returned with a select statement. It defaults to 32K. The maximum size for *@@textsize* is 2^{31} - 1 (that is, 2,147,483,647).
@@textts	Text timestamp of the column referenced by *@@textptr*.

text, unitext, and image values can be quite large. When the select list includes text and image values, the limit on the length of the data returned depends on the setting of the *@@textsize* global variable, which contains the limit on the number of bytes of text or image data a select returns. The default limit is 32K bytes for isql; the default depends on the client software. Change the value for a session with set textsize.

Converting *text* and *image* datatypes

You can explicitly convert text values to char, unichar, varchar, and univarchar, and image values to binary or varbinary with the convert function, but you are limited to the maximum length of the character and binary datatypes, which is determined by the maximum column size for your server's logical page size. If you do not specify the length, the converted value has a default length of 30 bytes. Implicit conversion is not supported.

Converting to or from unitext

You can implicitly convert any character or binary datatype to unitext, as well as explicitly convert to and from unitext to other datatypes. The conversion result, however, is limited to the maximum length of the destination datatype. When a unitext value cannot fit the destination buffer on a Unicode character boundary, data is truncated. If you have enabled enable surrogate processing, the unitext value is never truncated in the middle of a surrogate pair of values, which means that fewer bytes may be returned after the datatype conversion. For example, if a unitext column ut in table tb stores the string "U+0041U+0042U+00c2" (U+0041 representing the Unicode character "A"), this query returns the value "AB" if the server's character set is UTF-8, because U+00C2 is converted to 2-byte UTF-8 0xc382:

```
select convert(char(3), ut) from tb
```

Table 1-20: Converting to and from unitext

Conversion	Datatypes
These datatypes convert implicitly *to* unitext	char, varchar, unichar, univarchar, binary, varbinary, text, image
These datatypes convert implicitly *from* unitext	text, image
These datatypes convert explicitly *from* unitext	char, varchar, unichar, univarchar, binary, varbinary

The alter table modify command does not support text, image, or unitext columns to be the modified column. To migrate from a text to a unitext column:

- Use bcp out -Jutf8 out to copy text column data out
- Create a table with unitext columns
- Use bcp in -Jutf8 to insert data into the new table

Pattern matching in *text* data

Use the patindex function to search for the starting position of the first occurrence of a specified pattern in a text, unitext, varchar, univarchar, unichar, or char column. The % wildcard character must precede and follow the pattern (except when you are searching for the first or last character).

You can also use the like keyword to search for a particular pattern. The following example selects each text data value from the copy column of the blurbs table that contains the pattern "Net Etiquette."

```
select copy from blurbs
where copy like "%Net Etiquette%"
```

Duplicate rows

The pointer to the text, image, and unitext data uniquely identifies each row. Therefore, a table that contains text, image, and unitext data does not contain duplicate rows unless there are rows in which all text, image, and unitext data is NULL. If this is the case, the pointer has not been initialized.

Using large object *text*, *unitext*, and *image* datatypes in stored procedures

Adaptive Server allows you to:

- Declare a large object (LOB) text, image, or unitext datatype for a local variable, and pass that variable as an input parameter to a stored procedure.
- Prepare SQL statements that include LOB parameters.

Adaptive Server caches SQL statements using LOB when you enable the statement cache. See Chapter 3, "Configuring Memory," in the *System Administration Guide, Volume 2*.

Certain restrictions apply to using LOBs in stored procedures.

- LOB parameters are not supported for replication.
- You cannot use LOB datatype for execute immediate and deferred compilation.

Declaring a LOB datatype

To declare an LOB datatype for a local variable, use:

declare @*variable LOB_datatype*

where *LOB_datatype* is one of: text, image, and unitext.

This example declares the *text_variable* as text datatype:

```
declare @text_variable text
```

Creating a LOB parameter

To create an LOB parameter:, use

create procedure *proc_name* [@*parameter_name LOB_datatype*
as {*SQL_statement*}

This example creates the new_proc procedure which uses the text LOB datatype:

```
create procedure new_proc @v1 text
as
select char_length(@v1)
```

Using LOB datatypes

Example 1 Uses an LOB as the input parameter for a stored procedure:

1. Create table_1:

    ```
    create table t1 (a1 int, a2 text)
        insert into t1 values(1, "aaaa")
        insert into t1 values(2, "bbbb")
        insert into t1 values(3, "cccc")
    ```

2. Create a stored procedure using an LOB local variable as a parameter:

    ```
    create procedure my_procedure @new_var text
        as select @new_var
    ```

3. Declare the local variable and execute the stored procedure.

    ```
    declare @a text
    ```

```
select @a = a2 from t1 where a1 = 3
exec my_procedure @a
---------------------------
cccc
```

Example 2 Uses an LOB variable in a text function:

```
declare @a text
select @a = "abcdefgh"
select datalength(@a)
--------------
             8
```

Example 3 Declares an LOB text local variable:

```
declare @a text
select @a = '<doc><item><id>1</id><name>Box</name></item>'
    +'<item><id>2</id><name>Jar</name></item></doc>'
select id from xmltable ('/doc/item' passing @a
    columns id int path 'id', name varchar(20) path 'name')
as items_table
 id
-----------
          1
          2
```

And then passes the same LOB parameters to a stored procedure:

```
create proc pr1 @a text
as
select id from xmltable ('/doc/item' passing @a
columns id int path 'id', name varchar(20) path 'name') as items_table
declare @a text
select @a =
'<doc><item><id>1</id><name>Box</name></item>'
+'<item><id>2</id><name>Jar</name></item></doc>'
 id
-----------
          1
          2
```

Standards and compliance

ANSI SQL – Compliance level: The text, image, and unitext datatypes are Transact-SQL extensions.

Datatypes and encrypted columns

Table 1-21 lists the supported datatypes for encrypted columns, as well as the on-disk length of encrypted columns for datatypes supported for Adaptive Server version 15.0.2.

Table 1-21: Datatype length for encrypted columns

Datatype	Input data length	Encrypted column type	Max encrypted data length (no init_vector)	Actual encrypted data length (no init vector)	Max encrypted data length with init_vector	Actual encrypted data length (with init_vector)
date	4	varbinary	17	17	33	33
time	4	varbinary	17	17	33	33
smalldatetime	4	varbinary	17	17	33	33
bigdatetime	8	varbinary	17	17	33	33
bigtime	8	varbinary	17	17	33	33
datetime	8	varbinary	17	17	33	33
smallmoney	4	varbinary	17	17	33	33
money	8	varbinary	17	17	33	33
bit	8	varbinary	17	17	33	33
bigint	8	varbinary	17	1 7	33	33
unsigned bigint	8	varbinary	17	17	33	33
unichar(10)	2 (1 unichar character)	varbinary	33	17	49	33
unichar(10)	20 (10 unichar characters)	varbinary	33	33	49	49
univarchar(20)	20 (10 unichar characters)	varbinary	49	33	65	49

text, image, and unitext datatypes are not supported for this release of Adaptive Server.

User-defined datatypes

User-defined datatypes are built from the system datatypes and from the sysname or longsysname user-defined datatypes. After you create a user-defined datatype, you can use it to define columns, parameters, and variables. Objects that are created from user-defined datatypes inherit the rules, defaults, null type, and IDENTITY property of the user-defined datatype, as well as inheriting the defaults and null type of the system datatypes on which the user-defined datatype is based.

A user-defined datatype must be created in each database in which it will be used. Create frequently used types in the model database. These types are automatically added to each new database (including tempdb, which is used for temporary tables) as it is created.

Adaptive Server allows you to create user-defined datatypes, based on any system datatype, using sp_addtype. You cannot create a user-defined datatype based on another user-defined datatype, such as timestamp or the tid datatype in the pubs2 database.

The sysname and longsysname datatypes are exceptions to this rule. Though sysname and longsysname are user-defined datatypes, you can use them to build user-defined datatypes.

User-defined datatypes are database objects. Their names are case-sensitive and must conform to the rules for identifiers.

You can bind rules to user-defined datatypes with sp_bindrule and bind defaults with sp_bindefault.

By default, objects built on a user-defined datatype inherit the user-defined datatype's null type or IDENTITY property. You can override the null type or IDENTITY property in a column definition.

Use sp_rename to rename a user-defined datatype.

Use sp_droptype to remove a user-defined datatype from a database.

Note You cannot drop a datatype that is already in use in a table.

Use sp_help to display information about the properties of a system datatype or a user-defined datatype. You can also use sp_help to display the datatype, length, precision, and scale for each column in a table.

Standards and compliance

ANSI SQL – Compliance level: User-defined datatypes are a Transact-SQL extension.

CHAPTER 2 Transact-SQL Functions

This chapter describes each of the Transact-SQL functions. Functions are used to return information from the database. They are allowed in the select list, in the where clause, and anywhere an expression is allowed. They are often used as part of a stored procedure or program.

See the *Transact-SQL Users Guide*, Chapter 16, “Using Transact-SQL Functions in Queries,” for detailed information about how to use these functions.

See *XML Services* for detailed information about the XML functions: xmlextract, xmlparse, xmlrepresentation, xmltable, xmltest, and xmlvalidate.

The permission checks for Transact-SQL functions differ based on your granular permissions settings. See the *Security Administration Guide* for more information on granular permissions.

abs

Description Returns the absolute value of an expression.

Syntax abs(*numeric_expression*)

Parameters *numeric_expression*
is a column, variable, or expression with datatype that is an exact numeric, approximate numeric, money, or any type that can be implicitly converted to one of these types.

Examples Returns the absolute value of -1:

```
select abs(-1)

-----------
          1
```

Usage abs, a mathematical function, returns the absolute value of a given expression. Results are of the same type and have the same precision and scale as the numeric expression.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute abs.

See also **Documentation** *Transact-SQL Users Guide*

Functions ceiling, floor, round, sign

acos

Description

Returns the angle (in radians) of the specified cosine.

Syntax

acos(*cosine*)

Parameters

cosine

is the cosine of the angle, expressed as a column name, variable, or constant of type float, real, double precision, or any datatype that can be implicitly converted to one of these types.

Examples

Returns the angle where the cosine is 0.52:

```
select acos(0.52)

--------------------
            1.023945
```

Usage

acos, a mathematical function, returns the angle (in radians) where the cosine is the specified value.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute acos.

See also

Documentation *Transact-SQL Users Guide*

Functions cos, degrees, radians

ascii

Description

Returns the ASCII code for the first character in an expression.

Syntax

ascii(*char_expr* | *uchar_expr*)

Parameters

char_expr

is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr

is a character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

Returns the author's last names and the ACSII codes for the first letters in their last names, if the ASCII code is less than 70:

```
select au_lname, ascii(au_lname) from authors
where ascii(au_lname) < 70
```

```
 au_lname
 ------------------------------ -----------
 Bennet                                  66
 Blotchet-Halls                          66
 Carson                                  67
 DeFrance                                68
 Dull                                    68
```

Usage

- ascii, a string function, returns the ASCII code for the first character in the expression.
- When a string function accepts two character expressions but only one expression is unichar, the other expression is "promoted" and internally converted to unichar. This follows existing rules for mixed-mode expressions. However, this conversion may cause truncation, since unichar data sometimes takes twice the space.
- If *char_expr* or *uchar_expr* is NULL, returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute ascii.

See also

Documentation *Transact-SQL Users Guide*

Functions char, to_unichar

asehostname

Description

Returns the physical or virtual host on which Adaptive Server is running.

Syntax

asehostname

Parameters

None.

Examples

Returns the Adaptive Server host name:

```
select asehostname()

-----------------------------------
linuxkernel.sybase.com
```

Standards

SQL/92 and SQL/99 compliant

Permissions

Only users with the sa_role can execute asehostname.

asin

Description Returns the angle (in radians) of the specified sine.

Syntax asin(*sine*)

Parameters *sine*

is the sine of the angle, expressed as a column name, variable, or constant of type float, real, double precision, or any datatype that can be implicitly converted to one of these types.

Examples

```
select asin(0.52)

--------------------
            0.546851
```

Usage asin, a mathematical function, returns the angle (in radians) with a sine of the specified value.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute asin.

See also **Documentation** *Transact-SQL Users Guide*

Functions degrees, radians, sin

atan

Description

Returns the angle (in radians) of the specified tangent.

Syntax

atan(*tangent*)

Parameters

tangent

is the tangent of the angle, expressed as a column name, variable, or constant of type float, real, double precision, or any datatype that can be implicitly converted to one of these types.

Examples

```
select atan(0.50)

--------------------
            0.463648
```

Usage

atan, a mathematical function, returns the angle (in radians) of a tangent with the specified value.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute atan.

See also

Documentation *Transact-SQL Users Guide*

Functions atn2, degrees, radians, tan

atn2

Description Returns the angle (in radians) of the specified sine and cosine.

Syntax atn2(*sine*, *cosine*)

Parameters *sine*

is the sine of the angle, expressed as a column name, variable, or constant of type float, real, double precision, or any datatype that can be implicitly converted to one of these types.

cosine

is the cosine of the angle, expressed as a column name, variable, or constant of type float, real, double precision, or any datatype that can be implicitly converted to one of these types.

Examples

```
select atn2(.50, .48)

--------------------
            0.805803
```

Usage atn2, a mathematical function, returns the angle (in radians) whose sine and cosine are specified.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute atn2.

See also **Documentation** *Transact-SQL Users Guide*

Functions atan, degrees, radians, tan

avg

Description

Calculates the numeric average of all (distinct) values.

Syntax

avg([all | distinct] *expression*)

Parameters

all
applies avg to all values. all is the default.

distinct
eliminates duplicate values before avg is applied. distinct is optional.

expression
is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name. For more information, see "Expressions" on page 349.

Examples

Example 1 Calculates the average advance and the sum of total sales for all business books. Each of these aggregate functions produces a single summary value for all of the retrieved rows:

```
select avg(advance), sum(total_sales)
from titles
where type = "business"

------------------------ -----------
               6,281.25       30788
```

Example 2 Used with a group by clause, the aggregate functions produce single values for each group, rather than for the entire table. This statement produces summary values for each type of book:

```
select type, avg(advance), sum(total_sales)
from titles
group by type

type
 ------------ ------------------------ -----------
 UNDECIDED                        NULL        NULL
 business                     6,281.25       30788
 mod_cook                     7,500.00       24278
 popular_comp                 7,500.00       12875
 psychology                   4,255.00        9939
 trad_cook                    6,333.33       19566
```

Example 3 Groups the titles table by publishers and includes only those groups of publishers who have paid more than $25,000 in total advances and whose books average more than $15 in price:

```
select pub_id, sum(advance), avg(price)
from titles
group by pub_id
having sum(advance) > $25000 and avg(price) > $15
```

```
 pub_id
 ------ ------------------- -------------------
 0877             41,000.00               15.41
 1389             30,000.00               18.98
```

Usage

- avg, an aggregate function, finds the average of the values in a column. avg can only be used on numeric (integer, floating point, or money) datatypes. Null values are ignored in calculating averages.
- When you average (signed or unsigned) int, smallint, tinyint data , Adaptive Server returns the result as an int value. When you average (signed or unsigned) bigint data, Adaptive Server returns the result as a bigint value. To avoid overflow errors in DB-Library programs, declare variables used for resultrs appropriately.
- You cannot use avg with the binary datatypes.
- Since the average value is only defined on numeric datatypes, using avg Unicode expressions generates an error.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute avg.

See also

Documentation *Transact-SQL Users Guide*

Functions max, min

audit_event_name

Description

Returns a description of an audit event.

Syntax

audit_event_name(*event_id*)

Parameters

event_id
is the number of an audit event.

Examples

Example 1 Queries the audit trail for table creation events:

```
select * from audit_data where audit_event_name(event) = "Create Table"
```

Example 2 Obtains current audit event values. See the Usage section below for a complete list of audit values and their descriptions.

```
create table #tmp(event_id int, description varchar(255))
go
declare @a int
select @a=1
while (@a<120)
begin
      insert #tmp values (@a, audit_event_name(@a))
      select @a=@a + 1
end
select * from #tmp
go

-----------------------------------------
event_id    description
---------   -------------------
      1     Ad hoc Audit Record
      2     Alter Database
      ...
      104   Create Index
      105   Drop Index
```

Usage

The following lists the ID and name of each of the audit events:

1 Ad Hoc Audit record
2 Alter Database
3 Alter table
4 BCP In
5 NULL
6 Bind Default
7 Bind Message
8 Bind Rule
9 Create Database
10 Create Table
11 Create Procedure
12 Create Trigger
13 Create Rule
14 Create Default
15 Create Message
16 Create View
17 Access To Database
18 Delete Table
19 Delete View
20 Disk Init
21 Disk Refit
22 Disk Reinit
23 Disk Mirror
24 Disk Unmirror
25 Disk Remirror
26 Drop Database
27 Drop Table
28 Drop Procedure
29 Drop Trigger
30 Drop Rule
31 Drop Default
32 Drop Message
33 Drop View
34 Dump Database
35 Dump Transaction
36 Fatal Error
37 Nonfatal Error
38 Execution Of Stored Procedure
39 Execution Of Trigger
40 Grant Command
41 Insert Table
42 Insert View
43 Load Database
44 Load Transaction
45 Log In
46 Log Out
47 Revoke Command
48 RPC In
49 RPC Out
50 Server Boot
51 Server Shutdown
52 NULL
53 NULL
54 NULL
55 Role Toggling
56 NULL
57 NULL
58 NULL
59 NULL
60 NULL
61 Access To Audit Table
62 Select Table
63 Select View
64 Truncate Table
65 NULL
66 NULL
67 Unbind Default
68 Unbind Rule
69 Unbind Message
70 Update Table
71 Update View
72 NULL
73 Auditing Enabled
74 Auditing Disabled
75 NULL
76 SSO Changed Password
79 NULL
80 Role Check Performed
81 DBCC Command
82 Config
83 Online Database
84 Setuser Command
85 User-defined Function Command
86 Built-in Function
87 Disk Release
88 Set SSA Command
90 Connect Command
91 Reference
92 Command Text
93 JCS Install Command
94 JCS Remove Command
95 Unlock Admin Account
96 Quiesce Database Command
97 Create SQLJ Function
98 Drop SQLJ Function
99 SSL Administration
100 Disk Resize
101 Mount Database
102 Unmount Database
103 Login Command
104 Create Index
105 Drop Index
106 NULL
107 NULL
108 NULL
109 NULL
110 Deploy UDWS
111 Undeploy UDWS
115 Password Administration

Note Adaptive Server does not log events if audit_event_name returns NULL.

Standards

ANSI SQL – compliance level: Transact-SQL extension.

Permissions

Any user can execute audit_event_name.

See also

Commands select, sp_audit

authmech

Description

Determines what authentication mechanism is used by a specified logged in server process ID.

Syntax

authmech ([*spid*])

Examples

Example 1 Returns the authentication mechanism for server process ID 42, whether KERBEROS, LDAP, or any other mechanism:

```
select authmech(42)
```

Example 2 Returns the authentication mechanism for the current login's server process ID:

```
select authmech()
```

or

```
select authmech(0)
```

Example 3 Prints the authentication mechanism used for each login session:

```
select suid, authmech(spid)
    from sysprocesses where suid!=0
```

Usage

- This function returns output of type varchar from one optional argument.
- If the value of the server process ID is 0, the function returns the authentication method used by the server process ID of the current client session.
- If no argument is specified, the output is the same as if the value of the server process ID is 0.
- Possible return values include `ldap`, `ase`, `pam`, and NULL.

Permissions

The permission checks for authmech differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, any user can execute authmech to query a current personal session. You must have select permission on authmech to query the details of another user's session.
Granular permissions disabled	With granular permissions disabled, any user can execute authmech to query a current personal session. You must be a user with sso_role or have select permission on authmech to query the details of another user's session.

biginttohex

Description

Returns the platform-independent 8 byte hexadecimal equivalent of the specified integer.

Syntax

biginttohex (*integer_expression*)

Parameters

integer_expression
is the integer value to be converted to a hexadecimal string.

Examples

Converts the big integer -9223372036854775808 to a hexadecimal string:

```
1> select biginttohex(-9223372036854775808)
2> go
----------------
8000000000000000
```

Usage

- biginttohex, a datatype conversion function, returns the platform-independent hexadecimal equivalent of an integer, without a “0x” prefix.
- Use the biginttohex function for platform-independent conversions of integers to hexadecimal strings. biginttohex accepts any expression that evaluates to a bigint. It always returns the same hexadecimal equivalent for a given expression, regardless of the platform on which it is executed.

See also

Functions convert, hextobigint, hextoint, inttohex

bintostr

Description

Converts a sequence of hexadecimal digits to a string of its equivalent alphanumeric characters or varbinary data.

Syntax

select bintostr(*sequence of hexadecimal digits*)

Parameters

sequence of hexadecimal digits
is the sequence of valid hexadecimal digits, consisting of [0 – 9], [a – f] and [A – F], and which is prefixed with "0x".

Examples

Example 1 Converts the hexadecimal sequence of "0x723ad82fe" to an alphanumeric string of the same value:

```
1> select bintostr(0x723ad82fe)
2> go
-----------------------------------
0723ad82fe
```

In this example, the in-memory representation of the sequence of hexadecimal digits and its equivalent alphanumeric character string are:

Hexadecimal digits (5 bytes)

0	7	2	3	a	d	8	2	f	e

Alphanumeric character string (9 bytes)

0	7	2	3	a	d	8	2	f	e

The function processes hexadecimal digits from right to left. In this example, the number of digits in the input is odd. For this reason, the alphanumeric character sequence has a prefix of "0" and is reflected in the output.

Example 2 Converts the hexadecimal digits of a local variable called *@bin_data* to an alphanumeric string equivalent to the value of "723ad82fe":

```
declare @bin_data varchar(30)
select @bin_data = 0x723ad82fe
select bintostr(@bin_data)
go

----------
0723ad82fe
```

Usage

- Any invalid characters in the input results in null as the output.
- The input must be valid varbinary data.
- A NULL input results in NULL output.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions	Any user can execute bintostr.
See also	**Functions** strtobin

cache_usage

Description

Returns cache usage as a percentage of all objects in the cache to which the table belongs.

Syntax

cache_usage(*table_name*)

Parameters

table_name
is the name of a table. The name can be fully qualified (that is, it can include the database and owner name).

Examples

Example 1 Returns percentage of the cache used by the titles tables:

```
select cache_usage("titles")
----------------------------
                   98.876953
```

Example 2 Retuns, from the master database, the percentage of the cache used by the authors tables

```
select cache_usage ("pubs2..authors")
------------------------------------
                            98.876953
```

Usage

- cache_usage provides cache usage as percentage across all the pools of the cache.
- cache_usage does not provide any information on how much cache the current object is using, and does not provide information for cache usages of indexes if they are bound to different cache.
- (In cluster environments) cache_usage provides cache usage of the cache the object is bound to in current node.

Permissions

Any user can execute cache_usage.

case

Description

Supports conditional SQL expressions; can be used anywhere a value expression can be used.

Syntax

case and *expression* syntax:

```
case
    when search_condition then expression
    [when search_condition then expression]...
    [else expression]
end
```

case and *value* syntax:

```
case value
    when value then expression
    [when value then expression]...
    [else expression]
end
```

Parameters

case
: begins the case expression.

when
: precedes the search condition or the expression to be compared.

search_condition
: is used to set conditions for the results that are selected. Search conditions for case expressions are similar to the search conditions in a where clause. Search conditions are detailed in the *Transact-SQL User's Guide*.

then
: precedes the expression that specifies a result value of case.

expression and *value*
: is a column name, a constant, a function, a subquery, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators. For more information about expressions, see "Expressions" on page 349.

else
: is optional. When not specified, else null is implied.

Examples

Example 1 Selects all the authors from the authors table and, for certain authors, specifies the city in which they live:

```
select au_lname, postalcode,
    case
            when postalcode = "94705"
                then "Berkeley Author"
```

```
                when postalcode = "94609"
                    then "Oakland Author"
                when postalcode = "94612"
                    then "Oakland Author"
                when postalcode = "97330"
                    then "Corvallis Author"
            end
    from authors
```

Example 2 Returns the first occurrence of a non-NULL value in either the lowqty or highqty column of the discounts table:

```
select stor_id, discount,
        coalesce (lowqty, highqty)
from discounts
```

Yuo can also use the following format to produce the same result, since coalesce is an abbreviated form of a case expression:

```
select stor_id, discount,
        case
            when lowqty is not NULL then lowqty
            else highqty
        end
from discounts
```

Example 3 Selects the *titles* and *type* from the titles table. If the book type is UNDECIDED, nullif returns a NULL value:

```
select title,
        nullif(type, "UNDECIDED")
from titles
```

You can also use the following format to produce the same result, since nullif is an abbreviated form of a case expression:

```
select title,
        case
            when type = "UNDECIDED" then NULL
            else type
        end
from titles
```

Example 4 Produces an error message, because at least one expression must be something other than the null keyword:

```
select price, coalesce (NULL, NULL, NULL)
from titles

All result expressions in a CASE expression must not be NULL.
```

Example 5 Produces an error message, because at least two expressions must follow coalesce:

```
select stor_id, discount, coalesce (highqty) from discounts
```

```
A single coalesce element is illegal in a COALESCE expression.
```

Example 6 This case with *values* example updates salary information for employees:

```
update employees
    set salary =
        case dept
         when 'Video' then salary * 1.1
         when 'Music' then salary * 1.2
         else 0
        end
```

Example 7 In the movie_titles table, the movie_type column is encoded with an integer rather than the cha(10) needed to spell out "Horror," "Comedy," "Romance," and "Western." However, a text string is returned to applications through the use of case expression:

```
select title,
    case movie_type
        when 1 then 'Horror'
        when 2 then 'Comedy'
        when 3 then 'Romance'
        when 4 then 'Western'
        else null
    end,
    our_cost
from movie_titles
```

Usage

Use:

- case expression simplifies standard SQL expressions by allowing you to express a search condition using a when...then construct instead of an if statement.
- Use case with *value* when comparing values, where *value* is the value desired. If *value* equals *expression*, then the value of the case is *result*. If value1 does not equal express, valuet is compared to value2. If value equals value2, then the value of the CASE is result2. If none of the value1 ... valuen are equal to the desired valuet, then the value of the CASE is resultx. All of the resulti can be either a value expression or the keyword NULL. All of the valuei must be comparable types, and all of the results must have comparable datatypes. The data type of the

- case expressions can be used anywhere an expression can be used in SQL.
- If your query produces a variety of datatypes, the datatype of a case expression result is determined by datatype hierarchy, as described in "Datatypes of mixed-mode expressions" on page 6 in. If you specify two datatypes that Adaptive Server cannot implicitly convert (for example, char and int), the query fails.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

case permission defaults to all users. No permission is required to use it.

See also

Commands coalesce, nullif, if...else, select, where clause

cast

Description

Converts the specified value to another datatype.

Syntax

cast (*expression* as *datatype* [(*length* | *precision*[, *scale*])])

Parameters

expression

is the value to be converted from one datatype or date format to another. It includes columns, constants, functions, any combination of constants, and functions that are connected by arithmetic or bitwise operators orsubqueries.

When Java is enabled in the database, *expression* can be a value to be converted to a Java-SQL class.

When unichar is used as the destination datatype, the default length of 30 Unicode values is used if no length is specified.

length

is an optional parameter used with char, nchar, unichar, univarchar, varchar, nvarchar, binary and varbinary datatypes. If you do not supply a length, Adaptive Server truncates the data to 30 characters for character types and 30 bytes for binary types. The maximum allowable length for character and binary expression is 64K.

precision

is the number of significant digits in a numeric or decimal datatype. For float datatypes, precision is the number of significant binary digits in the mantissa. If you do not supply a precision, Adaptive Server uses the default precision of 18 for numeric and decimal datatypes.

scale

is the number of digits to the right of the decimal point in a numeric, or decimal datatype. If you do not supply a scale, Adaptive Server uses the default scale of 0.

Examples

Example 1 Converts the date into a more readable datetime format:

```
select cast("01/03/63" as datetime)
go

 --------------------------
        Jan  3 1963 12:00AM

(1 row affected)
```

Example 2 Converts the total_sales column in the title database to a 12-character column:

```
select title, cast(total_sales as char(12))
```

Usage

- cast uses the default format for date and time datatypes.
- cast generates a domain error when the argument falls outside the range over which the function is defined. This should happen rarely.
- You cannot use null/not null keywords to specify the resulting datatype's nullability. You can, however, use cast with the null value itself to achieve a nulalble result datatype. To convert a value to a nullable datatype, you the convert() function, which does allow the use of null/not null keywords.
- You can use cast to convert an image column to binary or varbinary. You are limited to the maximum length of the binary datatypes that is determined by the maximum column size for your server's logical page size. If you do not specify the length, the converted value has a default length of 30 characters.
- You can use unichar expressions as a destination datatype, or they can be converted to another datatype. unichar expressions can be converted either explicitly between any other datatype supported by the server, or implicitly.
- If you do not specify length when unichar is used as a destination type, the default length of 30 Unicode values is used. If the length of the destination type is not large enough to accommodate the given expression, an error message appears.

Implicit conversion

Implicit conversion between types when the primary fields do not match may cause data truncation, the insertion of a default value, or an error message to be raised. For example, when a datetime value is converted to a date value, the time portion is truncated, leaving only the date portion. If a time value is converted to a datetime value, a default date portion of Jan 1, 1900 is added to the new datetime value. If a date value is converted to a datetime value, a default time portion of 00:00:00:000 is added to the datetime value.

```
DATE -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
TIME -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME -> DATE
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME  -> TIME
```

Explicit conversion

If you attempt to explicitly convert a date to a datetime, and the value is outside the datetime range such as "Jan 1, 1000" the conversion is not allowed and an informative error message is raised.

```
DATE -> UNICHAR, UNIVARCHAR
TIME -> UNICHAR, UNIVARCHAR
```

```
UNICHAR, UNIVARCHAR -> DATE
UNICHAR, UNIVARCHAR -> TIME
```

Conversions involving Java classes

- When Java is enabled in the database, you can use cast to change datatypes in these ways:
  - Convert Java object types to SQL datatypes.
  - Convert SQL datatypes to Java types.
  - Convert any Java-SQL class installed in Adaptive Server to any other Java-SQL class installed in Adaptive Server if the compile-time datatype of the expression (the source class) is a subclass or superclass of the target class.

  The result of the conversion is associated with the current database.

Standards

ANSI SQL – Compliance level: ANSI compliant.

Permissions

Any user can execute cast.

ceiling

Description

Returns the smallest integer greater than or equal to the specified value.

Syntax

ceiling(*value*)

Parameters

value

is a column, variable, or expression with a datatype is exact numeric, approximate numeric, money, or any type that can be implicitly converted to one of these types.

Examples

Example 1 Returns a value of 124:

```
select ceiling(123.45)
```

```
124
```

Example 2 Returns a value of -123:

```
select ceiling(-123.45)
```

```
-123
```

Example 3 Returns a value of 24.000000:

```
select ceiling(1.2345E2)
```

```
24.000000
```

Example 4 Returns a value of -123.000000:

```
select ceiling(-1.2345E2)
```

```
-123.000000
```

Example 5 Returns a value of 124.00

```
select ceiling($123.45)
```

```
124.00
```

Example 6 Returns values of "discount" from the salesdetail table where title_id is the value "PS3333":

```
select discount, ceiling(discount) from salesdetail
where title_id = "PS3333"
```

```
discount
 -------------------- --------------------
            45.000000            45.000000
            46.700000            47.000000
            46.700000            47.000000
            50.000000            50.000000
```

Usage

- ceiling, a mathematical function, returns the smallest integer that is greater than or equal to the specified value. The return value has the same datatype as the value supplied.

  For numeric and decimal values, results have the same precision as the value supplied and a scale of zero.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute ceiling.

See also

Documentation *Transact-SQL Users Guide*

Command set

Functions abs, floor, round, sign

char

Description

Returns the character equivalent of an integer.

Syntax

char(*integer_expr*)

Parameters

integer_expr
is any integer (tinyint, smallint, or int) column name, variable, or constant expression between 0 and 255.

Examples

Example 1

```
select char(42)

-
*
```

Example 2

```
select xxx = char(65)

xxx
---
A
```

Usage

- char, a string function, converts a single-byte integer value to a character value (char is usually used as the inverse of ascii).
- char returns a char datatype. If the resulting value is the first byte of a multibyte character, the character may be undefined.
- If *char_expr* is NULL, returns NULL.

Reformatting output with char

- You can use concatenation and char values to add tabs or carriage returns to reformat output. char(10) converts to a return; char(9) converts to a tab. For example:

```
/* just a space */
select title_id +  " " + title from titles where title_id = "T67061"
/* a return */
select title_id + char(10) + title from titles where title_id = "T67061"
/* a tab */
select title_id + char(9) + title from titles where title_id = "T67061"
-----------------------------------------------------------------------
T67061 Programming with Curses
-----------------------------------------------------------------------
T67061

Programming with Curses
-----------------------------------------------------------------------
```

```
T67061        Programming with Curses
```

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute char.

See also
Documentation *Transact-SQL Users Guide*

Functions ascii, str

char_length

Description

Returns the number of characters in an expression.

Syntax

char_length(*char_expr* | *uchar_expr*)

Parameters

char_expr
is a character-type column name, variable, or constant expression of char, varchar, nchar, text_locator, unitext_locator, or nvarchar type.

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

Example 1

```
select char_length(notes) from titles
    where title_id = "PC9999"
 -----------
          39
```

Example 2

```
declare @var1 varchar(20), @var2 varchar(20), @char char(20)
    select @var1 = "abcd", @var2 = "abcd    ", @char = "abcd"
    select char_length(@var1), char_length(@var2), char_length(@char)
                 ----------- ----------- -----------
                           4           8          20
```

Usage

- char_length, a string function, returns an integer representing the number of characters in a character expression or text value.
- For compressed large object (LOB) columns, char_length returns the number of original plain text characters.
- For variable-length columns and variables, char_length returns the number of characters (not the defined length of the column or variable). If explicit trailing blanks are included in variable-length variables, they are not stripped. For literals and fixed-length character columns and variables, char_length does not strip the expression of trailing blanks (see Example 2).
- For unitext, unichar, and univarchar columns, char_length returns the number of Unicode values (16-bit), with one surrogate pair counted as two Unicode values. For example, this is what is returned if a unitext column ut contains row value U+0041U+0042U+d800dc00:

```
select char_length(ut) from unitable
------------
4
```

- For multibyte character sets, the number of characters in the expression is usually fewer than the number of bytes; use datalength to determine the number of bytes.
- For Unicode expressions, returns the number of Unicode values (not bytes) in an expression. Surrogate pairs count as two Unicode values.
- If *char_expr* or *uchar_expr* is NULL, char_length returns NULL.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute char_length.

See also **Documentation** *Transact-SQL Users Guide*

Function datalength

charindex

Description

Returns an integer representing the starting position of an expression.

Syntax

charindex(*expression1*, *expression2* [, *start*])

Parameters

expression

is a binary or character column name, variable, or constant expression. Can be char, varchar, nchar, nvarchar, unichar, univarchar, binary, text_locator, unitext_locator, image_locator or varbinary.

start

when specified, causes the search for *expression1* to start at the given offset in *expression2*. When *start* is not given, the search start at the beginning of *expression2*. *start* can be an expression, but must return an integer value.

Examples

Example 1 Returns the position at which the character expression "wonderful" begins in the notes column of the titles table:

```
select charindex("wonderful", notes)
from titles
where title_id = "TC3218"

-----------
         46
```

Example 2 This query executes successfully, returning zero rows. The column spt_values.name is defined as varchar(35):

```
select name
from spt_values
where charindex( 'NO', name, 1000 ) > 0
```

In comparison, this query does not use *start*, returning the position at which the character expression "wonderful" begins in the notes column of the titles table:

```
select charindex("wonderful", notes)
from titles
where title_id = "TC3218"

-----------
         46
```

Usage

- charindex, a string function, searches *expression2* for the first occurrence of *expression1* and returns an integer representing its starting position. If *expression1* is not found, charindex returns 0.
- If *expression1* contains wildcard characters, charindex treats them as literals.
- If *expression2* is NULL, returns 0.

- If a varchar expression is given as one parameter and a unichar expression as the other, the varchar expression is implicitly converted to unichar (with possible truncation).
- If only one of *expression1* or *expression2* is a locator, the datatype of the other expression must be implicitly convertible to the datatype of the LOB referenced by the locator.
- When *expression1* is a locator, the maximum length of the LOB referenced by the locator is 16KB.
- The *start* value is interpreted as the number of characters to skip before starting the search for varchar, univarchar, text_locator, and unitext_locator datatypes, and as the number of bytes for binary and image_locator datatypes.
- The maximum length of *expression1* is 16,384 bytes.
- If a varchar expression is given as one parameter and a unichar expression as the other, the varchar expression is implicitly converted to unichar (with possible truncation).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute charindex.

See also

Documentation *Transact-SQL Users Guide*

Function patindex

coalesce

Description

Supports conditional SQL expressions; can be used anywhere a value expression can be used; alternative for a case expression.

Syntax

coalesce(*expression*, *expression* [, *expression*]...)

Parameters

coalesce
: evaluates the listed expressions and returns the first non-null value. If all expressions are null, coalesce returns NULL.

expression
: is a column name, a constant, a function, a subquery, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators. For more information about expressions, see “Expressions” on page 349.

Examples

Example 1 Returns the first occurrence of a non-null value in either the lowqty or highqty column of the discounts table:

```
select stor_id, discount,
        coalesce (lowqty, highqty)
from discounts
```

Example 2 An alternative way of writing the previous example:

```
select stor_id, discount,
        case
            when lowqty is not NULL then lowqty
            else highqty
        end
from discounts
```

Usage

- coalesce expression simplifies standard SQL expressions by allowing you to express a search condition as a simple comparison instead of using a when...then construct.
- You can use coalesce expressions anywhere an expression in SQL.
- At least one result of the coalesce expression must return a non-null value. This example produces the following error message:

```
select price, coalesce (NULL, NULL, NULL)
from titles

All result expressions in a CASE expression must not be NULL.
```

- If your query produces a variety of datatypes, the datatype of a case expression result is determined by datatype hierarchy, as described in "Datatypes of mixed-mode expressions" on page 6. If you specify two datatypes that Adaptive Server cannot implicitly convert (for example, char and int), the query fails.
- coalesce is an abbreviated form of a case expression. Example 2 describes an alternative way of writing the coalesce statement.
- coalesce must be followed by at least two expressions. This example produces the following error message:

```
select stor_id, discount, coalesce (highqty)
from discounts
```

```
A single coalesce element is illegal in a COALESCE expression.
```

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute coalesce.

See also — **Commands** case, nullif, select, if...else, where clause

col_length

Description

Returns the defined length of a column.

Syntax

col_length(*object_name*, *column_name*)

Parameters

object_name
is name of a database object, such as a table, view, procedure, trigger, default, or rule. The name can be fully qualified (that is, it can include the database and owner name). It must be enclosed in quotes.

column_name
is the name of the column.

Examples

Finds the length of the title column in the titles table. The “x” gives a column heading to the result:

```
select x = col_length("titles", "title")

 x
----
   80
```

Usage

- col_length, a system function, returns the defined length of column.
- To find the actual length of the data stored in each row, use datalength.
- For text, unitext, and image columns, col_length returns 16, the length of the binary(16) pointer to the actual text page.
- For unichar columns, the defined length is the number of Unicode values declared when the column was defined (not the number of bytes represented).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute col_length.

See also

Documentation *Transact-SQL Users Guide*

Function datalength

col_name

Description — Returns the name of the column where the table and column IDs are specified, and can be up to 255 bytes in length.

Syntax — col_name(*object_id*, *column_id* [, *database_id*])

Parameters

object_id
is a numeric expression that is an object ID for a table, view, or other database object. These are stored in the id column of sysobjects.

column_id
is a numeric expression that is a column ID of a column. These are stored in the colid column of syscolumns.

database_id
is a numeric expression that is the ID for a database. These are stored in the db_id column of sysdatabases.

Examples

```
select col_name(208003772, 2)

------------------------------
title
```

Usage — col_name, a system function, returns the column's name.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute col_name.

See also — **Documentation** *Transact-SQL Users Guide*

Functions db_id, object_id

compare

Description

Allows you to directly compare two character strings based on alternate collation rules.

Syntax

```
compare ({char_expression1|uchar_expression1},
        {char_expression2|uchar_expression2}),
        [{collation_name | collation_ID}]
```

Parameters

char_expression1 or *uchar_expression1*
: are the character expressions to compare to *char_expression2* or *uchar_expression 2*.

char_expression2 or *uchar_expression2*
: are the character expressions against which to compare *char_expression1* or *uchar_expression1*.

char_expression1 and *char_expression2* can be:

- Character type (char, varchar, nchar, or nvarchar)
- Character variable, or
- Constant character expression, enclosed in single or double quotation marks

uchar_expression1 and *uchar_expression2* can be:

- Character type (unichar or univarchar)
- Character variable, or
- Constant character expression, enclosed in single or double quotation marks

collation_name
: can be a quoted string or a character variable that specifies the collation to use. Table 2-2 on page 88 shows the valid values.

collation_ID
: is an integer constant or a variable that specifies the collation to use. Table 2-2 on page 88 shows the valid values.

Examples

Example 1 Compares aaa and bbb:

```
1> select compare ("aaa","bbb")
2> go

 -----------
          -1
(1 row affected)
```

Alternatively, you can also compare aaa and bbb using this format:

```
1> select compare (("aaa"),("bbb"))
2> go

 -----------
          -1
(1 row affected)
```

Example 2 Compares aaa and bbb and specifies binary sort order:

```
1> select compare ("aaa","bbb","binary")
2> go

 -----------
          -1
(1 row affected)
```

Alternatively, you can compare aaa and bbb using this format, and the collation ID instead of the collation name:

```
1> select compare (("aaa"),("bbb"),(50))
2> go

 -----------
          -1
(1 row affected)
```

Usage

- The compare function returns the following values, based on the collation rules that you chose:
  - 1 – indicates that *char_expression1* or *uchar_expression1* is greater than *char_expression2* or *uchar_expression2*.
  - 0 – indicates that *char_expression1* or *uchar_expression1* is equal to *char_expression2* or *uchar_expression2*.
  - -1 – indicates that *char_expression1* or *uchar_expression1* is less than *char_expression2* or *uchar expression2*.
- compare can generate up to six bytes of collation information for each input character. Therefore, the result from using compare may exceed the length limit of the varbinary datatype. If this happens, the result is truncated to fit. Adaptive Server issues a warning message, but the query or transaction that contained the compare function continues to run. Since this limit is dependent on the logical page size of your server, truncation removes result bytes for each input character until the result string is less than the following for DOL and APL tables:

Table 2-1: Maximum row and column length—APL and DOL

Locking scheme	Page size	Maximum row length	Maximum column length
APL tables	2K (2048 bytes)	1962	1960 bytes
	4K (4096 bytes)	4010	4008 bytes
	8K (8192 bytes)	8106	8104 bytes
	16K (16384 bytes)	16298	16296 bytes
DOL tables	2K (2048 bytes)	1964	1958 bytes
	4K (4096 bytes)	4012	4006 bytes
	8K (8192 bytes)	8108	8102 bytes
	16K (16384 bytes)	16300	16294 bytes if table does not include any variable length columns
	16K (16384 bytes)	16300 (subject to a max start offset of varlen = 8191)	8191-6-2 = 8183 bytes if table includes at least on variable length column.*

* This size includes six bytes for the row overhead and two bytes for the row length field

- Both *char_expression1*, *uchar_expression1*, and *char_expression2*, *uchar_expression2* must be characters that are encoded in the server's default character set.
- *char_expression1*, *uchar_expression 1*, or *char_expression2*, *uchar_expression2*, or both, can be empty strings:
  - If *char_expression2* or *uchar_expression2* is empty, the function returns 1.
  - If both strings are empty, then they are equal, and the function returns 0.
  - If *char_expression1* or *uchar_expression 1* is empty, the function returns -1.

  The compare function does not equate empty strings and strings containing only spaces. compare uses the sortkey function to generate collation keys for comparison. Therefore, a truly empty string, a string with one space, or a string with two spaces do not compare equally.
- If either *char_expression1*, *uchar_expression1*; or *char_expression2*, *uchar_expression2* is NULL, then the result is NULL.
- If a varchar expression is given as one parameter and a unichar expression is given as the other, the varchar expression is implicitly converted to unichar (with possible truncation).
- If you do not specify a value for *collation_name* or *collation_ID*, compare assumes binary collation.

- Table 2-2 lists the valid values for *collation_name* and *collation_ID*.

Table 2-2: Collation names and IDs

Description	Collation name	Collation ID
Deafult Unicode multilingual	default	20
Thai dictionary order	thaidict	21
ISO14651 standard	iso14651	22
UTF-16 ordering – matches UTF-8 binary ordering	utf8bin	24
CP 850 Alternative – no accent	altnoacc	39
CP 850 Alternative – lowercase first	altdict	45
CP 850 Western European – no case preference	altnocsp	46
CP 850 Scandinavian – dictionary ordering	scandict	47
CP 850 Scandinavian – case-insensitive with preference	scannocp	48
GB Pinyin	gbpinyin	n/a
Binary sort	binary	50
Latin-1 English, French, German dictionary	dict	51
Latin-1 English, French, German no case	nocase	52
Latin-1 English, French, German no case, preference	nocasep	53
Latin-1 English, French, German no accent	noaccent	54
Latin-1 Spanish dictionary	espdict	55
Latin-1 Spanish no case	espnocs	56
Latin-1 Spanish no accent	espnoac	57
ISO 8859-5 Russian dictionary	rusdict	58
ISO 8859-5 Russian no case	rusnocs	59
ISO 8859-5 Cyrillic dictionary	cyrdict	63
ISO 8859-5 Cyrillic no case	cyrnocs	64
ISO 8859-7 Greek dictionary	elldict	65
ISO 8859-2 Hungarian dictionary	hundict	69
ISO 8859-2 Hungarian no accents	hunnoac	70
ISO 8859-2 Hungarian no case	hunnocs	71
ISO 8859-9 Turkish dictionary	turdict	72
ISO 8859-9 Turkish no accents	turknoac	73
ISO 8859-9 Turkish no case	turknocs	74
CP932 binary ordering	cp932bin	129
Chinese phonetic ordering	dynix	130
GB2312 binary ordering	gb2312bn	137
Common Cyrillic dictionary	cyrdict	140
Turkish dictionary	turdict	155

Description	Collation name	Collation ID
EUCKSC binary ordering	euckscbn	161
Chinese phonetic ordering	gbpinyin	163
Russian dictionary ordering	rusdict	165
SJIS binary ordering	sjisbin	179
EUCJIS binary ordering	eucjisbn	192
BIG5 binary ordering	big5bin	194
Shift-JIS binary order	sjisbin	259

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute compare.

See also

Function sortkey

convert

Description

Converts the specified value to another datatype or a different datetime display format.

Syntax

convert (*datatype* [(*length*) | (*precision*[, *scale*])]
    [null | not null], *expression* [, *style*])

Parameters

datatype

is the system-supplied datatype (for example, char(10), unichar (10), varbinary (50), or int) into which to convert the expression. You cannot use user-defined datatypes.

When Java is enabled in the database, *datatype* can also be a Java-SQL class in the current database.

length

is an optional parameter used with char, nchar, unichar, univarchar, varchar, nvarchar, binary, and varbinary datatypes. If you do not supply a length, Adaptive Server truncates the data to 30 characters for the character types and 30 bytes for the binary types. The maximum allowable length for character and binary expression is 64K.

precision

is the number of significant digits in a numeric or decimal datatype. For float datatypes, precision is the number of significant binary digits in the mantissa. If you do not supply a precision, Adaptive Server uses the default precision of 18 for numeric and decimal datatypes.

scale

is the number of digits to the right of the decimal point in a numeric, or decimal datatype. If you do not supply a scale, Adaptive Server uses the default scale of 0.

null | not null

specifies the nullabilty of the result expression. If you do not supply either null or not null, the converted result has the same nullability as the expression.

expression

is the value to be converted from one datatype or date format to another.

When Java is enabled in the database, *expression* can be a value to be converted to a Java-SQL class.

When unichar is used as the destination datatype, the default length of 30 Unicode values is used if no length is specified.

style

is the display format to use for the converted data. When converting money or smallmoney data to a character type, use a *style* of 1 to display a comma after every 3 digits.

When converting datetime or smalldatetime data to a character type, use the style numbers in Table 2-3 to specify the display format. Values in the left-most column display 2-digit years (*yy*). For 4-digit years (*yyyy*), add 100, or use the value in the middle column.

When converting date data to a character type, use style numbers 1 through 7 (101 through 107) or 10 through 12 (110 through 112) in Table 2-3 to specify the display format. The default value is 100 (mon dd yyyy hh:miAM (or PM)). If date data is converted to a style that contains a time portion, that time portion reflects the default value of zero.

When converting time data to a character type, use style number 8 or 9 (108 or 109) to specify the display format. The default is 100 (mon dd yyyy hh:miAM (or PM)). If time data is converted to a style that contains a date portion, the default date of Jan 1, 1900 is displayed.

Table 2-3: Date format conversions using the style parameter

Without century (yy)	With century (yyyy)	Standard	Output
-	0 or 100	Default	*mon dd yyyy hh:mm* AM (or PM)
1	101	USA	*mm/dd/yy*
2	2	SQL standard	*yy.mm.dd*
3	103	English/French	*dd/mm/yy*
4	104	German	*dd.mm.yy*
5	105		*dd-mm-yy*
6	106		*dd mon yy*
7	107		*mon dd, yy*
8	108		*HH:mm:ss*
-	9 or 109	Default + milliseconds	*mon dd yyyy hh:mm:ss* AM (or PM)
10	110	USA	*mm-dd-yy*
11	111	Japan	*yy/mm/dd*
12	112	ISO	*yymmdd*
13	113		*yy/dd/mm*
14	114		*mm/yy/dd*

Key “mon” indicates a month spelled out, “mm” the month number or minutes. “HH ”indicates a 24-hour clock value, “hh” a 12-hour clock value. The last row, 23, includes a literal “T” to separate the date and time portions of the format.

Without century (yy)	With century (yyyy)	Standard	Output
14	114		*hh:mi:ss:mmm*AM(or PM)
15	115		*dd/yy/mm*
-	16 or 116		*mon dd yyyy HH:mm:ss*
17	117		*hh:mmAM*
18	118		*HH:mm*
19			*hh:mm:ss:zzzAM*
20			*hh:mm:ss:zzz*
21			*yy/mm/dd HH:mm:ss*
22			*yy/mm/dd HH:mm* AM (or PM)
23			*yyyy-mm-ddTHH:mm:ss*

Key "mon" indicates a month spelled out, "mm" the month number or minutes. "HH "indicates a 24-hour clock value, "hh" a 12-hour clock value. The last row, 23, includes a literal "T" to separate the date and time portions of the format.

The default values (*style* 0 or 100), and *style* 9 or 109 return the century (*yyyy*). When converting to char or varchar from smalldatetime, styles that include seconds or milliseconds show zeros in those positions.

Examples

Example 1

```
select title, convert(char(12), total_sales)
from titles
```

Example 2

```
select title, total_sales
from titles
where convert(char(20), total_sales) like "1%"
```

Example 3 Converts the current date to style 3, dd/mm/yy:

```
select convert(char(12), getdate(), 3)
```

Example 4 If the value pubdate can be null, you must use varchar rather than char, or errors may result:

```
select convert(varchar(12), pubdate, 3) from titles
```

Example 5 Returns the integer equivalent of the string "0x00000100". Results can vary from one platform to another:

```
select convert(integer, 0x00000100)
```

Example 6 Returns the platform-specific bit pattern as a Sybase binary type:

```
select convert (binary, 10)
```

Example 7 Returns 1, the bit string equivalent of $1.11:

```
select convert(bit, $1.11)
```

Example 8 Creates #tempsales with total_sales of datatype char(100), and does not allow null values. Even if titles.total_sales was defined as allowing nulls, #tempsales is created with #tempsales.total_sales not allowing null values:

```
select title, convert (char(100) not null, total_sales)
into #tempsales
from titles
```

Usage

- convert, a datatype conversion function, converts between a wide variety of datatypes and reformats date/time and money data for display purposes.
- If they are compressed, convert decompresses large object (LOB) columns before converting them to other datatypes.
- convert – returns the specified value, converted to another datatype or a different datetime display format. When converting from unitext to other character and binary datatypes, the result is limited to the maximum length of the destination datatype. If the length is not specified, the converted value has a default size of 30 bytes. If you are using enabled enable surrogate processing, a surrogate pair is returned as a whole. For example, this is what is returned if you convert a unitext column that contains data U+0041U+0042U+20acU+0043 (stands for "AB €") to a UTF-8 varchar(3) column:

  ```
  select convert(varchar(3), ut) from untable
  ---
  AB
  ```

- convert generates a domain error when the argument falls outside the range over which the function is defined. This should happen rarely.
- Use null or not null to specify the nullability of a target column. Specifically, this can be used with select into to create a new table and change the datatype and nullability of existing columns in the source table (See Example 8, above).

  The result is an undefined value if:

  - The expression being converted is to a not null result.
  - The expression's value is null.

  Use the following select statement to generate a known non-NULL value for predictable results:

```
select convert(int not null isnull(col2, 5)) from table1
```

- You can use convert to convert an image column to binary or varbinary. You are limited to the maximum length of the binary datatypes, which is determined by the maximum column size for your server's logical page size. If you do not specify the length, the converted value has a default length of 30 characters.
- You can use unichar expressions as a destination datatype or you can convert them to another datatype. unichar expressions can be converted either explicitly between any other datatype supported by the server, or implicitly.
- If you do not specify the length when unichar is used as a destination type, the default length of 30 Unicode values is used. If the length of the destination type is not large enough to accommodate the given expression, an error message appears.

Implicit conversion

Implicit conversion between types when the primary fields do not match may cause data truncation, the insertion of a default value, or an error message to be raised. For example, when a datetime value is converted to a date value, the time portion is truncated, leaving only the date portion. If a time value is converted to a datetime value, a default date portion of Jan 1, 1900 is added to the new datetime value. If a date value is converted to a datetime value, a default time portion of 00:00:00:000 is added to the datetime value.

```
DATE -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
TIME -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME -> DATE
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME  -> TIME
```

Explicit conversion

If you attempt to explicitly convert a date to a datetime and the value is outside the datetime range, such as "Jan 1, 1000" the conversion is not allowed and an informative error message is raised.

```
DATE -> UNICHAR, UNIVARCHAR
TIME -> UNICHAR, UNIVARCHAR
UNICHAR, UNIVARCHAR -> DATE
UNICHAR, UNIVARCHAR -> TIME
```

Conversions involving Java classes

- When Java is enabled in the database, you can use convert to change datatypes in these ways:
    - Convert Java object types to SQL datatypes.
    - Convert SQL datatypes to Java types.

- Convert any Java-SQL class installed in Adaptive Server to any other Java-SQL class installed in Adaptive Server if the compile-time datatype of the expression (the source class) is a subclass or superclass of the target class.

The result of the conversion is associated with the current database.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute convert.

See also

Documents *Transact-SQL Users Guide*; *Java in Adaptive Server Enterprise* for a list of allowed datatype mappings and more information about datatype conversions involving Java classes.

Datatypes User-defined datatypes

Functions hextoint, inttohex

cos

Description Returns the cosine of the angle specified in radians.

Syntax cos(*angle*)

Parameters *angle*

is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

Examples

```
select cos(44)

 0.999843
```

Usage cos, a mathematical function, returns the cosine of the specified angle, in radians.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute cos.

See also **Documentation** *Transact-SQL Users Guide*

Functions acos, degrees, radians, sin

cot

Description

Returns the cotangent of the angle specified in radians.

Syntax

cot(*angle*)

Parameters

angle

is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

Examples

```
select cot(90)

--------------------
           -0.501203
```

Usage

cot, a mathematical function, returns the cotangent of the specified angle, in radians.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute cot.

See also

Documentation *Transact-SQL Users Guide*

Functions degrees, radians, sin

count

Description

Returns the number of (distinct) non-null values, or the number of selected rows as an integer.

Syntax

count([all | distinct] *expression*)

Parameters

all
applies count to all values. all is the default.

distinct
eliminates duplicate values before count is applied. distinct is optional.

expression
is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name. For more information, see "Expressions" on page 349.

Examples

Example 1 Finds the number of different cities in which authors live:

```
select count(distinct city)
from authors
```

Example 2 Lists the types in the titles table, but eliminates the types that include only one book or none:

```
select type
from titles
group by type
having count(*) > 1
```

Usage

- count, an aggregate function, finds the number of non-null values in a column.
- When distinct is specified, count finds the number of unique non-null values. count can be used with all datatypes, including unichar, but cannot be used with text and image. Null values are ignored when counting.
- count(*column_name*) returns a value of 0 on empty tables, on columns that contain only null values, and on groups that contain only null values.
- count(*) finds the number of rows. count(*) does not take any arguments, and cannot be used with distinct. All rows are counted, regardless of the presence of null values.
- When tables are being joined, include count(*) in the **select list** to produce the count of the number of rows in the joined results. If the objective is to count the number of rows from one table that match criteria, use count(*column_name*).

- You can use count as an existence check in a subquery. For example:

```
select * from tab where 0 <
    (select count(*) from tab2 where ...)
```

  However, because count counts all matching values, exists or in may return results faster. For example:

```
select * from tab where exists
    (select * from tab2 where ...)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute count.

See also

Commands compute clause, group by and having clauses, select, where clause

Documentation *Transact-SQL Users Guide*

count_big

Description

Returns the number of (distinct) non-null values, or the number of selected rows as a bigint.

Syntax

count_big([all | distinct] *expression*)

Parameters

all
: applies count_big to all values. all is the default.

distinct
: eliminates duplicate values before count_big is applied. distinct is optional.

expression
: is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name.

Examples

Finds the number of occurances of *name* in systypes:

```
1> select count_big(name) from systypes
2> go
--------------------
42
```

Usage

- count_big, an aggregate function, finds the number of non-null values in a column.
- When distinct is specified, count_big finds the number of unique non-null values. Null values are ignored when counting.
- count_big(*column_name*) returns a value of 0 on empty tables, on columns that contain only null values, and on groups that contain only null values.
- count_big(*) finds the number of rows. count_big(*) does not take any arguments, and cannot be used with distinct. All rows are counted, regardless of the presence of null values.
- When tables are being joined, include count_big(*) in the select list to produce the count of the number of rows in the joined results. If the objective is to count the number of rows from one table that match criteria, use count_big(*column_name*).
- You can use count_big as an existence check in a subquery. For example:

  ```
  select * from tab where 0 <
      (select count_big(*) from tab2 where ...)
  ```

  However, because count_big counts all matching values, exists or in may return results faster. For example:

```
select * from tab where exists
    (select * from tab2 where ...)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute count_big.

See also

Commands compute clause, group by and having clauses, select, where clause

create_locator

Description

Explicitly creates a locator for a specified LOB then returns the locator.

The locator created by create_locator is valid only for the duration of the transaction containing the query that used create_locator. If no transaction was started, then the locator is valid only until the query containing the create_locator completes execution

Syntax

create_locator (*datatype*, *lob_expression*)

Parameters

datatype

is the datatype of the LOB locator. Valid values are:

- text_locator
- unitext_locator
- image_locator

lob_expression

is a LOB value of datatype text, unitext, or image.

Examples

Example 1 Creates a text locator from a simple text expression:

```
select create_locator(text_locator, convert (text, "abc"))
```

Example 2 Creates a local variable *@v* of type text_locator, and then creates a locator using *@v* as a handle to the LOB stored in the textcol column of my_table.

```
declare @v text_locator

    select @v = create_locator(text_locator, textcol) from my_table where
id=10
```

Permissions

Any user can execute create_locator.

See also

Commands deallocate locator, truncate lob

Transact-SQL functions locator_literal, locator_valid, return_lob

current_bigdatetime

Description

Returns a bigtime value representing the current time with microcecond precision. The accuracy of the current time portion is limited by the accuracy of the system clock.

Syntax

current_bigdatetime()

Parameters

None.

Examples

Example 1 Find the current bigdatetime:

```
select current_bigdatetime())
------------------------------
Nov 25 1995 10:32:00.010101AM
```

Example 2 Find the current bigdatetime:

```
select datepart(us, current_bigdatetime())
------------------------------
010101
```

Usage

Finds the current date as it exists on the server.

Standards

ANSI SQL – Compliance level: Entry-level compliant.

Permissions

Any user can execute current_date.

See also

Datatypes Date and time datatypes

Commands select, where clause

Functions dateadd, datediff, datepart, datename, current_bigtime

current_bigtime

Description

Returns a bigtime value representing the current time with microcecond precision. The accuracy of the current time portion is limited by the accuracy of the system clock.

Syntax

current_bigtime()

Parameters

None.

Examples

Example 1 Finds the current bigtime:

```
select current_bigtime())
------------------------------
10:32:00.010101AM
```

Example 2 Finds the current bigtime:

```
select datepart(us, current_bigtime())
------------------------------
01010
```

Usage

Finds the current date as it exists on the server.

Standards

ANSI SQL – Compliance level: Entry-level compliant.

Permissions

Any user can execute current_date.

See also

Datatypes Date and time datatypes

Commands select, where clause

Functions dateadd, datediff, datepart, datename, current_bigdatetime

current_date

Description
Returns the current date.

Syntax
current_date()

Parameters
None.

Examples
Example 1 Identifies the current date with datename:

```
1> select datename(month, current_date())
2> go

------------------------------
August
```

Example 2 Identifies the current date with datepart:

```
1> select datepart(month, current_date())
2> go

-----------
8

(1 row affected)
```

Usage
Finds the current date as it exists on the server.

Standards
ANSI SQL – Compliance level: Entry-level compliant.

Permissions
Any user can execute current_date.

See also
Datatypes Date and time datatypes

Commands select, where clause

Functions dateadd, datename, datepart, getdate

current_time

Description Returns the current time.

Syntax current_time()

Parameters None.

Examples **Example 1** Finds the current time:

```
1> select current_time()
2> go

------------------------
            12:29PM

(1 row affected)
```

Example 2 Use with datename:

```
1> select datename(minute, current_time())
2> go

------------------------------
45

(1 row affected)
```

Usage Finds the current time as it exists on the server

Standards ANSI SQL – Compliance level: Entry-level compliant.

Permissions Any user can execute current_time.

See also **Datatypes** Date and time datatypes

Commands select, where clause

Functions dateadd, datename, datepart, getdate

curunreservedpgs

Description
Displays the number of free pages in the specified disk piece.

Syntax
curunreservedpgs (dbid, lstart, unreservedpgs)

Parameters

dbid
is the ID for a database. These are stored in the db_id column of sysdatabases.

lstart
is the starting logical page number for the disk piece for which you are retrieving data. lstart uses an unsigned int datatype.

unreservedpgs
is the default value curunreservedpgs returns if no in-memory data is available. unreservedpgs uses an unsigned int datatype.

Examples

Example 1 Returns the database name, device name, and the number of unreserved pages for each device fragment

If a database is open, curunreservedpgs takes the value from memory. If it is not in use, the value is taken from the third parameter you specify in curunreservedpgs. In this example, the value comes from the unreservedpgs column in the sysusages table.

```
select
(dbid), d.name,
    curunreservedpgs(dbid, lstart, unreservedpgs)
    from sysusages u, sysdevices d
where u.vdevno=d.vdevno
and d.status &2 = 2
```

```
                                name
------------------------------ ------------------------- -----------
master                          master                           1634
tempdb                          master                            423
model                           master                            423
pubs2                           master                             72
sybsystemdb                     master                            399
sybsystemprocs                  master                           6577
sybsyntax                       master                            359

(7 rows affected)
```

Example 2 Displays the number of free pages on the segment for dbid starting on sysusages.lstart:

```
select curunreservedpgs (dbid, sysusages.lstart, 0)
```

Usage

- curunreservedpgs, a system function, returns the number of free pages in a disk piece.
- If a database is open, the value returned by curunreservedpgs is taken from memory. If it is not in use, the value is taken from the third parameter you specify in curunreservedpgs.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute curunreservedpgs.

See also

Documentation *Transact-SQL Users Guide*

Functions db_id, lct_admin

data_pages

Description

Returns the number of pages used by the specified table, index, or a specific partition. The result does not include pages used for internal structures.

This function replaces data_pgs and ptn_data_pgs from versions of Adaptive Server earlier than 15.0.

Syntax

data_pages(*dbid*, *object_id* [, *indid* [, *ptnid*]])

Parameters

dbid
is the database ID of the database that contains the data pages.

object_id
is an object ID for a table, view, or other database object. These are stored in the id column of sysobjects.

indid
is the index ID of the target index.

ptnid
is the partition ID of the target partition.

Examples

Example 1 Returns the number of pages used by the object with a object ID of 31000114 in the specified database (including any indexes):

```
select data_pages(5, 31000114)
```

Example 2 (In cluster environments) Returns the number of pages used by the object in the data layer, regardless of whether or not a clustered index exists:

```
select data_pages(5, 31000114, 0)
```

Example 3 (In cluster environments) Returns the number of pages used by the object in the index layer for a clustered index. This does not include the pages used by the data layer:

```
select data_pages(5, 31000114, 1)
```

Example 4 Returns the number of pages used by the object in the data layer of the specific partition, which in this case is 2323242432:

```
select data_pages(5, 31000114, 0, 2323242432)
```

Usage

- In the case of an APL (all-pages lock) table, if a clustered index exists on the table, then passing in an *indid* of:
  - 0 – reports the data pages.
  - 1 – reports the index pages.

All erroneous conditions return a value of zero, such as when the *object_id* does not exist in the current database, or the targeted *indid* or *ptnid* cannot be found.

- Instead of consuming resources, data_pages discards the descriptor for an object that is not already in the cache.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute data_pages.

See also

Functions object_id, row_count

System procedure sp_spaceused

datachange

Description

Measures the amount of change in the data distribution since update statistics last ran. Specifically, it measures the number of inserts, updates, and deletes that have occurred on the given object, partition, or column, and helps you determine if invoking update statistics would benefit the query plan.

Syntax

datachange(*object_name*, *partition_name*, *column_name*)

Parameters

object_name
is the object name in the current database.

partition_name
is the data partition name. This value can be null.

column_name
is the column name for which the datachange is requested. This value can be null.

Examples

Example 1 Provides the percentage change in the au_id column in the author_ptn partition:

```
select datachange("authors", "author_ptn", "au_id")
```

Example 2 Provides the percentage change in the authors table on the au_ptn partition. The null value for the *column_name* parameter indicates that this checks all columns that have historgram statistics and obtains the maximum datachange value from among them.

```
select datachange("authors", "au_ptn", null)
```

Usage

- The datachange function requires all three parameters.
- datachange is a measure of the inserts, deletes and updates but it does not count them individually. datachange counts an update as a delete and an insert, so each update contributes a count of 2 towards the datachange counter.
- The datachange built-in returns the datachange count as a percent of the number of rows, but it bases this percentage on the number of rows remaining, not the original number of rows. For example, if a table has five rows and one row is deleted, datachange reports a value of 25 % since the current row count is 4 and the datachange counter is 1.
- datachange is expressed as a percentage of the total number of rows in the table, or partition if you specify a partition. The percentage value can be greater than 100 percent because the number of changes to an object can be much greater than the number of rows in the table, particularly when the number of deletes and updates happening to a table is very high.

- The value that datachange displays is the in-memory value. This can differ from the on-disk value because the on-disk value gets updated by the housekeeper, when you run sp_flushstats, or when an object descriptor gets flushed.
- The datachange values is not reset when histograms are created for global indexes on partitioned tables.
- Instead of consuming resources, datachange discards the descriptor for an object that is not already in the cache.

datachange is reset or initialized to zero when:

- New columns are added, and their datachange value is initialized.
- New partitions are added, and their datachange value is initialized.
- Data-partition-specific histograms are created, deleted or updated. When this occurs, the datachange value of the histograms is reset for the corresponding column and partition.
- Data is truncated for a table or partition, and its datachange value is reset
- A table is repartitioned either directly or indirectly as a result of some other command, and the datachange value is reset for all the table's partitions and columns.
- A table is unpartitioned, and the datachange value is reset for all columns for the table.

datachange has the following restrictions:

- datachange statistics are not maintained on tables in system tempdbs, user-defined tempdbs, system tables, or proxy tables.
- datachange updates are non-transactional. If you roll back a transaction, the datachange values are not rolled back, and these values can become inaccurate.
- If memory allocation for column-level counters fails, Adaptive Server tracks partition-level datachange values instead of column-level values.
- If Adaptive Server does not maintain column-level datachange values, it then resets the partition-level datachange values whenever the datachange values for a column are reset.

Permissions

Any user can execute datachange.

datalength

Description

Returns the actual length, in bytes, of the specified column or string.

Syntax

datalength(*expression*)

Parameters

expression

is a column name, variable, constant expression, or a combination of any of these that evaluates to a single value. *expression* can be of any datatype, an is usually a column name. If *expression* is a character constant, it must be enclosed in quotes.

Examples

Finds the length of the pub_name column in the publishers table:

```
select Length = datalength(pub_name)
from publishers
```

```
Length
-----------
         13
         16
         20
```

Usage

- datalength, a system function, returns the length of *expression* in bytes.
- datalength returns the uncompressed length of a large object column, even when the column is compressed.
- For columns defined for the Unicode datatype, datalength returns the actual number of bytes of the data stored in each row. For example, this is what is returned if a unitext column ut contains row value U+0041U+0042U+d800dc00:

  ```
  select datalength(ut) from unitable
  -------------
  8
  ```

- datalength finds the actual length of the data stored in each row. datalength is useful on varchar, univarchar, varbinary, text, and image datatypes, since these datatypes can store variable lengths (and do not store trailing blanks). When a char or unichar value is declared to allow nulls, Adaptive Server stores it internally as varchar or univarchar. For all other datatypes, datalength reports the defined length.
- datalength accepts the text_locator, unitext_locator, and image_locator LOB datatypes.
- datalength of any NULL data returns NULL.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute datalength.

See also — **Functions** char_length, col_length

dateadd

Description

Adds an interval to a specified date or time.

Syntax

dateadd(*date_part*, *integer*, {*date* | *time* | *bigtime* | *datetime*, | *bigdatetime*})

Parameters

date_part
is a date part or abbreviation. For a list of the date parts and abbreviations recognized by Adaptive Server, see *Transact-SQL Users Guide*.

numeric
is an integer expression.

date expression
is an expression of type datetime, smalldatetime, bigdatetime, bigtime, date, time, or a character string in a datetime format.

Examples

Example 1 Adds one million microseconds to a bigtime:

```
declare @a bigtime
select @a = "14:20:00.010101"
select dateadd(us, 1000000, @a)
------------------------------
2:20:01.010101PM
```

Example 2 Adds 25 hours to a bigdatetime and the day will increment:

```
declare @a bigdatetime
select @a = "apr 12, 0001 14:20:00 "
select dateadd(hh, 25, @a)
------------------------------
Apr 13 0001   2:20PM
```

Example 3 Displays the new publication dates when the publication dates of all the books in the titles table slip by 21 days:

```
select newpubdate = dateadd(day, 21, pubdate)
from titles
```

Example 4 Adds one day to a date:

```
declare @a date
select @a = "apr 12, 9999"
select dateadd(dd, 1, @a)
--------------------------
Apr 13 9999
```

Example 5 Subtracts five minutes to a time:

```
select dateadd(mi, -5, convert(time, "14:20:00"))
--------------------------
2:15PM
```

Example 6 Adds one day to a time and the time remains the same:

```
declare @a time
select @a = "14:20:00"
select dateadd(dd, 1, @a)
--------------------------
2:20PM
```

Example 7 Adds higher values resulting in the values rolling over to the next significant field, even though there are limits for each date_part, as with datetime values:

```
--Add 24 hours to a datetime
select dateadd(hh, 24, "4/1/1979")
--------------------------
Apr  2 1979 12:00AM

--Add 24 hours to a date
select dateadd(hh, 24, "4/1/1979")
-------------------------
Apr  2 1979
```

Usage

- dateadd, a date function, adds an interval to a specified date. For information about dates, see *Transact-SQL Users Guide*.
- dateadd takes three arguments: the date part, a number, and a date. The result is a datetime value equal to the date plus the number of date parts. If the last argument is a bigtime, and the datepart is a year, month, or day, the result is the original bigtime argument.

  If the date argument is a smalldatetime value, the result is also a smalldatetime. You can use dateadd to add seconds or milliseconds to a smalldatetime, but such an addition is meaningful only if the result date returned by dateadd changes by at least one minute.
- If a string is given as an argument in place of the chronological value the server interprets it as a datetime value regardless of its apparent precision. This default behavior may be changed by setting the configuration parameter builtin date strings or the set option builtin_date_strings. When these options are set the server will interpret strings given to chronological builtins as bigdatetimes. See the *System Administration Guide* for more information.
- When a datepart of microseconds is given to this builtin string values will always be interpreted as bigdatetime.

- Use the datetime datatype only for dates after January 1, 1753. datetime values must be enclosed in single or double quotes. Use the date datatype for dates from January 1, 0001 to 9999. date must be enclosed in single or double quotes.Use char, nchar, varchar, or nvarchar for earlier dates. Adaptive Server recognizes a wide variety of date formats. For more information, see “User-defined datatypes” on page 47 and *Transact-SQL Users Guide*.

  Adaptive Server automatically converts between character and datetime values when necessary (for example, when you compare a character value to a datetime value).

- Using the date part weekday or dw with dateadd is not logical, and produces spurious results. Use day or dd instead.

Table 2-4: date_part recognized abbreviations

Date part	Abbreviation	Values
Year	yy	1753 – 9999 (datetime) 1900 – 2079 (smalldatetime) 0001 – 9999 (date)
Quarter	qq	1 – 4
Month	mm	1 – 12
Week	wk	1054
Day	dd	1 – 7
dayofyear	dy	1 – 366
Weekday	dw	1 – 7
Hour	hh	0 – 23
Minute	mi	0 – 59
Second	ss	0 – 59
millisecond	ms	0 – 999
microsecond	us	0 – 999999

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute dateadd.

See also **Datatypes** Date and time datatypes

Commands select, where clause

Functions datediff, datename, datepart, getdate

datediff

Description

Calculates the number of date parts between two specified dates or times.

Syntax

datediff(*datepart*, {*date, date* | *time*, *time* | *bigtime*, *bigtime* | *datetime*, *datetime* | *bigdatetime*, *bigdatetime*}])

Parameters

datepart

is a date part or abbreviation. For a list of the date parts and abbreviations recognized by Adaptive Server, see *Transact-SQL Users Guide*.

date expression1

is an expression of type datetime, smalldatetime, bigdatetime, bigtime, date, time, or a character string in a datetime format.

date expression2

is an expression of type datetime, smalldatetime, bigdatetime, bigtime, date, time, or a character string in a datetime format.

Examples

Example 1 Returns the number of microseconds between two bigdatetimes:

```
declare @a bigdatetime
declare @b bigdatetime
select @a = "apr 1, 1999  00:00:00.000000"
select @b = "apr 2, 1999  00:00:00.000000"
select datediff(us, @a, @b)
--------------------------
86400000000
```

Example 2 Returns the overflow size of milliseconds return value:

```
select datediff(ms, convert(bigdatetime, "4/1/1753"),
convert(bigdatetime, "4/1/9999"))
Msg 535, Level 16, State 0:
Line 2:
Difference of two datetime fields caused overflow at
runtime.
Command has been aborted
```

Example 3 Finds the number of days that have elapsed between pubdate and the current date (obtained with the getdate function):

```
select newdate = datediff(day, pubdate, getdate())
    from titles
```

Example 4 Finds the number of hours between two times:

```
declare @a time
declare @b time
select @a = "20:43:22"
select @b = "10:43:22"
```

```
select datediff(hh, @a, @b)
-----------
   -10
```

Example 5 Finds the number of hours between two dates:

```
declare @a date
declare @b date
select @a = "apr 1, 1999"
select @b = "apr 2, 1999"
select datediff(hh, @a, @b)
-----------
     24
```

Example 6 Finds the number of days between two times:

```
declare @a time
declare @b time
select @a = "20:43:22"
select @b = "10:43:22"
select datediff(dd, @a, @b)
-----------
     0
```

Example 7 Returns the overflow size of milliseconds return value:

```
select datediff(ms, convert(date, "4/1/1753"), convert(date, "4/1/9999"))
Msg 535, Level 16, State 0:
Line 2:
Difference of two datetime fields caused overflow at runtime.
Command has been aborted
```

Usage

- datediff takes three arguments. The first is a datepart. The second and third are chronological values. For dates, times, datetimes and bigdatetimes, the result is a signed integer value equal to date2 and date1, in date parts.

  •If the second or third argument is a date, and the datepart is an hour, minute, second, millisecond, or microsecond, the dates are treated as midnight.

  •If the second or third argument is a time, and the datepart is a year, month, or day, then zero is returned.

  •datediff results are truncated, not rounded when the result is not an even multiple of the datepart.

  •For the smaller time units, there are overflow values and the function returns an overflow error if you exceed these limits.

- datediff produces results of datatype int, and causes errors if the result is greater than 2,147,483,647. For milliseconds, this is approximately 24 days, 20:31.846 hours. For seconds, this is 68 years, 19 days, 3:14:07 hours.
- datediff results are always truncated, not rounded, when the result is not an even multiple of the date part. For example, using hour as the date part, the difference between "4:00AM" and "5:50AM" is 1.

  When you use day as the date part, datediff counts the number of midnights between the two times specified. For example, the difference between January 1, 1992, 23:00 and January 2, 1992, 01:00 is 1; the difference between January 1, 1992 00:00 and January 1, 1992, 23:59 is 0.
- The month datepart counts the number of first-of-the-months between two dates. For example, the difference between January 25 and February 2 is 1; the difference between January 1 and January 31 is 0.
- When you use the date part week with datediff, you see the number of Sundays between the two dates, including the second date but not the first. For example, the number of weeks between Sunday, January 4 and Sunday, January 11 is 1.
- If you use smalldatetime values, they are converted to datetime values internally for the calculation. Seconds and milliseconds in smalldatetime values are automatically set to 0 for the purpose of the difference calculation.
- If the second or third argument is a date, and the datepart is hour, minute, second, or millisecond, the dates are treated as midnight.
- If the second or third argument is a time, and the datepart is year, month, or day, then 0 is returned.
- datediff results are truncated, not rounded, when the result is not an even multiple of the date part.
- If a string is given as an argument in place of the chronological value the server interprets it as a datetime value regardless of its apparent precision. This default behavior may be changed by setting the configuration parameter builtin date strings or the set option builtin_date_strings. When these options are set the server will interpret strings given to chronological builtins as bigdatetimes. See the *System Administration Guide* for more information.
- When a datepart of microseconds is given to this builtin string values will always be interpreted as bigdatetime.

- For the smaller time units, there are overflow values, and the function returns an overflow error if you exceed these limits:
    - Microseconds:approx 3 days
    - Milliseconds: approx 24 days
    - Seconds: approx 68 years
    - Minutes: approx 4083 years
    - Others: No overflow limit

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute datediff.

See also

Datatypes Date and time datatypes

Commands select, where clause

Functions dateadd, datename, datepart, getdate

datename

Description

Returns the specified datepart of the specified date or time as a character string.

Syntax

datename(*datepart* {*date* | *time* | *bigtime* | *datetime* | *bigdatetime*})

Parameters

datepart

is a date part or abbreviation. For a list of the date parts and abbreviations recognized by Adaptive Server, see *Transact-SQL Users Guide*.

date_expression

is an expression of type datetime, smalldatetime, bigdatetime, bigtime, time or a character string in a datetime format.

Examples

Example 1 Finds the month name of a bigdatetime:

```
declare @a bigdatetime
select @a = "apr 12, 0001 00:00:00.010101"
select datename(mm, @a)
------------------------------
April
```

Example 2 Assumes a current date of November 20, 2000:

```
select datename(month, getdate())

November
```

Example 3 Finds the month name of a date:

```
declare @a date
select @a = "apr 12, 0001"
select datename(mm, @a)
------------------------------
    April
```

Example 4 Finds the seconds of a time:

```
declare @a time
select @a = "20:43:22"
select datename(ss, @a)
------------------------------
    22
```

Usage

- datename, a date function, returns the name of the specified part (such as the month “June”) of a datetime or smalldatetime value, as a character string. If the result is numeric, such as “23” for the day, it is still returned as a character string.
- Takes a date, time, bigdatetime, bigtime, datetime, or smalldatetime value as its second argument

- The date part weekday or dw returns the day of the week (Sunday, Monday, and so on) when used with datename.
- Since smalldatetime is accurate only to the minute, when a smalldatetime value is used with datename, seconds and milliseconds are always 0.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute datename.

See also

Datatypes Date and time datatypes

Commands select, where clause

Functions dateadd, datename, datepart, getdate

datepart

Description

Returns the integer value of the specified part of a date expression

Syntax

datepart(*date_part* {*date* | *time* | *datetime* | *bigtime* | *bigdatetime*}))

Parameters

date_part

is a date part. Table 2-5 lists the date parts, the abbreviations recognized by datepart, and the acceptable values.

Table 2-5: Date parts and their values

Date part	Abbreviation	Values
year	yy	1753 – 9999 (2079 for smalldatetime). 0001 to 9999 for date
quarter	qq	1 – 4
month	mm	1 – 12
week	wk	1 – 54
day	dd	1 – 31
dayofyear	dy	1 – 366
weekday	dw	1 – 7 (Sun. – Sat.)
hour	hh	0 – 23
minute	mi	0 – 59
second	ss	0 – 59
millisecond	ms	0 – 999
microsecond	us	0 - 999999
calweekofyear	cwk	1 – 53
calyearofweek	cyr	1753 – 9999 (2079 for smalldatetime). 0001 to 9999 for date
caldayofweek	cdw	1 – 7

When you enter a year as two digits (*yy*):

- Numbers less than 50 are interpreted as 20*yy*. For example, `01` is 2001, `32` is 2032, and `49` is 2049.
- Numbers equal to or greater than 50 are interpreted as 19*yy*. For example, `50` is 1950, `74` is 1974, and `99` is 1999.

  For datetime, smalldatetime, and time types milliseconds can be preceded by either a colon or a period. If preceded by a colon, the number means thousandths of a second. If preceded by a period, a single digit means tenths of a second, two digits mean hundredths of a second, and three digits mean thousandths of a second. For example, "12:30:20:1" means twenty and one-thousandth of a second past 12:30; "12:30:20.1" means twenty and one-tenth of a second past 12:30.

  Microseconds must be preceded by a decimal point and represent fractions of a second.

date_expression
is an expression of type datetime, smalldatetime, bigdatetime, bigtime, date, time, or a character string in a datetime format.

Examples

Example 1 Finds the microseconds of a bigdatetime:

```
declare @a bigdatetime
select @a = "apr 12, 0001 12:00:00.000001"
select datepart(us, @a)
-----------
000001
```

Example 2 Assumes a current date of November 25, 1995:

```
select datepart(month, getdate())

-----------
         11
```

Example 3 Returns the year of publication from traditional cookbooks:

```
select datepart(year, pubdate) from titles
    where type = "trad_cook"

 -----------
        1990
        1985
        1987
```

Example 4

```
select datepart(cwk,'1993/01/01')

-----------
         53
```

Example 5

```
select datepart(cyr,'1993/01/01')

-----------
       1992
```

Example 6

```
select datepart(cdw,'1993/01/01')

-----------
          5
```

Example 7 Find the hours in a time:

```
declare @a time
select @a = "20:43:22"
select datepart(hh, @a)
-----------
    20
```

Example 8 Returns 0 (zero) if an hour, minute, or second portion is requested from a date using datename or datepar) the result is the default time; Returns the default date of Jan 1 1990 if month, day, or year is requested from a time using datename or datepart:

```
--Find the hours in a date
declare @a date
select @a = "apr 12, 0001"
select datepart(hh, @a)
-----------
    0

--Find the month of a time
declare @a time
select @a = "20:43:22"
select datename(mm, @a)
------------------------------
January
```

When you give a null value to a datetime function as a parameter, NULL is returned.

Usage

- Returns the specified datepart in the first argument of the specified date, and the second argument, as an integer. Takes a date, time, datetime, bigdatetime, bigtime, or smalldatetime value as its second argument. If the datepart is hour, minute, second, millisecond, or microsecond, the result is 0.
- datepart returns a number that follows ISO standard 8601, which defines the first day of the week and the first week of the year. Depending on whether the datepart function includes a value for calweekofyear, calyearofweek, or caldayorweek, the date returned may be different for the same unit of time. For example, if Adaptive Server is configured to use U.S. English as the default language, the following returns 1988:

  ```
  datepart(cyr, "1/1/1989")
  ```

  However, the following returns 1989:

  ```
  datepart(yy, "1/1/1989)
  ```

  This disparity occurs because the ISO standard defines the first week of the year as the first week that includes a Thursday *and* begins with Monday.

  For servers using U.S. English as their default language, the first day of the week is Sunday, and the first week of the year is the week that contains January 4th.
- The date part weekday or dw returns the corresponding number when used with datepart. The numbers that correspond to the names of weekdays depend on the datefirst setting. Some language defaults (including us_english) produce Sunday=1, Monday=2, and so on; others produce Monday=1, Tuesday=2, and so on.You can change the default behavior on a per-session basis with set datefirst. See the datefirst option of the set command for more information.
- calweekofyear, which can be abbreviated as cwk, returns the ordinal position of the week within the year. calyearofweek, which can be abbreviated as cyr, returns the year in which the week begins. caldayofweek, which can abbreviated as cdw, returns the ordinal position of the day within the week. You cannot use calweekofyear, calyearofweek, and caldayofweek as date parts for dateadd, datediff, and datename.
- Since datetime and time are only accurate to 1/300th of a second, when these datatypes are used with datepart, milliseconds are rounded to the nearest 1/300th second.
- Since smalldatetime is accurate only to the minute, when a smalldatetime value is used with datepart, seconds and milliseconds are always 0.

- The values of the weekday date part are affected by the language setting.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute datepart.

See also
Datatypes Date and time datatypes

Commands select, where clause

Functions dateadd, datediff, datename, getdate

day

Description

Returns an integer that represents the day in the datepart of a specified date.

Syntax

day(*date_expression*)

Parameters

date_expression
is an expression of type datetime, smalldatetime, date, or a character string in a datetime format.

Examples

Returns the integer 02:

```
day("11/02/03")
----------
02
```

Usage

day(*date_expression*) is equivalent to datepart(dd,*date_expression*).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute day.

See also

Datatypes datetime, smalldatetime, date, time

Functions datepart, month, year

db_attr

Description

Returns the durability, dml_logging, and template settings, and compression level for the specified database.

Syntax

db_attr('*database_name*' | *database_ID* | NULL, 'attribute')

Parameters

database_name
name of the database.

database_ID
ID of the database

NULL
if included, db_attr reports on the current database

attribute
is one of:

- help – display db_attr usage information.
- durability – returns durability of the given database: full, at_shutdown, or no_recovery.
- dml_logging – returns the value for data manipulation language (DML) logging for specified database: full or minimal.
- template – returns the name of the template database used for the specified database. If no database was used as a template to create the database, returns NULL.
- compression – returns the compression level for the database.

Examples

Example 1 Returns the syntax for db_attr:

```
select db_attr(0, "help")
-----------------------------------------------------
Usage: db_attr('dbname' | dbid | NULL, 'attribute')
List of options in attributes table:
         0 : help
         1 : durability
         2 : dml_logging
         3 : template
         4 : compression
```

Example 2 Selects the name, durability setting, dml_logging setting and template used from sysdatabses:

```
select  name = convert(char(20), name),
durability = convert(char(15), db_attr(name,     "durability")),
```

```
    dml_logging = convert(char(15), db_attr(dbid,     "dml_logging")),
    template = convert(char(15), db_attr(dbid, "template"))
from sysdatabases
name              durability        dml_logging                 template
----------------  ----------------  ------------------------    --------
master            full              full                        NULL
model             full              full                        NULL
tempdb            no_recovery       full                        NULL
sybsystemdb       full              full                        NULL
sybsystemprocs    full              full                        NULL
repro             full              full                        NULL
imdb              no_recovery       full                        db1
db                full              full                        NULL
at_shutdown_db    at_shutdown       full                        NULL
db1               full              full                        NULL
dml               at_shutdown       minimal                     NULL
```

Example 3 Runs db_attr against the DoesNotExist database, which does not exist:

```
select db_attr("DoesNotExist", "durability")
-----------------------------------------------------
NULL
```

Example 4 Runs db_attr against a database with an ID of 12345, which does not exist:

```
select db_attr(12345, "durability")
-----------------------------------------------------
NULL
```

Example 5 Runs db_attr against an attribute that does not exist:

```
select db_attr(1, "Cmd Does Not Exist")
-----------------------------------------------------
NULL
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute db_attr.

See also

Functions

db_id

Description — Displays the ID number of the specified database.

Syntax — db_id(*database_name*)

Parameters — *database_name*

is the name of a database. *database_name* must be a character expression. If it is a constant expression, it must be enclosed in quotes.

Examples — Returns the ID number of sybsystemprocs:

```
select db_id("sybsystemprocs")

------
4
```

Usage

- db_id, a system function, returns the database ID number.
- If you do not specify a *database_name*, db_id returns the ID number of the current database.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute db_id.

See also — **Documentation** *Transact-SQL Users Guide*

Functions db_name, object_id

db_instanceid

Description

(Cluster environments only) Returns the ID of the owning instance of a specified local temporary database. Returns NULL if the specified database is a global temporary database or a nontemporary database.

Syntax

db_instanceid(*database_id*)
db_instanceid(*database_name*)

Parameters

database_id
ID of the database.

database_name
name of the database

Examples

Returns the owning instance for database ID 5

```
select db_instanceid(5)
```

Usage

- Access to a local temporary database is allowed only from the owning instance. db_instanceid determines whether the specified database is a local temporary database, and the owning instance for the local temporary database.You can then connect to the owning instance and access its local temporary database.
- You must include an parameter with db_instanceid.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can run sdc_intempdbconfig.

db_name

Description

Displays the name of the database with the specified ID number.

Syntax

db_name([*database_id*])

Parameters

database_id
is a numeric expression for the database ID (stored in sysdatabases.dbid).

Examples

Example 1 Returns the name of the current database:

```
select db_name()
```

Example 2 Returns the name of database ID 4:

```
select db_name(4)

------------------------------
sybsystemprocs
```

Usage

- db_name, a system function, returns the database name.
- If no *database_id* is supplied, db_name returns the name of the current database.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute db_name.

See also

Documentation *Transact-SQL Users Guide*

Functions col_name, db_id, object_name

db_recovery_status

Description

(Cluster environments only) Returns the recovery status of the specified database. Returns the recovery status of the current database if you do not include a value for *database_ID* or *database_name*.

Syntax

db_recovery_status([*database_ID* | *database_name*])

Parameters

database_ID
is the ID of the database whose recovery status you are requesting.

database_name
is the name of the database whose recovery status you are requesting.

Examples

Example 1 Returns the recovery status of the current database:

```
select db_recovery_status()
```

Example 2 Returns the recovery status of the database with named test:

```
select db_recovery_status("test")
```

Example 3 Returns the recovery status of a database with a database id of 8:

```
select db_recovery_status(8)
```

Usage

A return value of 0 indicates the database is not in node-failover recovery. A return value of 1 indicates the database is in node-failover recovery.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute db_recovery_status.

degrees

Description

Returns the size, in degrees, of the angle specified in radians.

Syntax

degrees(*numeric*)

Parameters

numeric
is a number, in radians, to convert to degrees.

Examples

```
select degrees(45)

-----------
       2578
```

Usage

degrees, a mathematical function, converts radians to degrees. Results are of the same type as the numeric expression.

For numeric and decimal expressions, the results have an internal precision of 77 and a scale equal to that of the expression.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute degrees.

See also

Documentation *Transact-SQL Users Guide*

Function radians

derived_stat

Description

Returns derived statistics for the specified object and index.

Syntax

derived_stat("*object_name*" | *object_id*,
index_name | *index_id*,
["*partition_name*" | *partition_id*,]
"*statistic*")

Parameters

object_name
is the name of the object you are interested in. If you do not specify a fully qualified object name, derived_stat searches the current database.

object_id
is an alternative to *object_name*, and is the object ID of the object you are interested in. *object_id* must be in the current database

index_name
is the name of the index, belonging to the specified object that you are interested in.

index_id
is an alternative to *index_name*, and is the index ID of the specified object that you are interested in.

partition_name
is the name of the partition, belonging to the specific partition that you are interested in. *partition_name* is optional. When you use *partition_name* or *partition_id*, Adaptive Server returns statistics for the target partition, instead of for the entire object.

partition_id
is an alternative to *partition_name*, and is the partition ID of the specified object that you are interested in. *partition_id* is optional.

"*statistic*"
the derived statistic to be returned. Available statistics are:

- data page cluster ratio or dpcr – the data page cluster ratio for the object/index pair
- index page cluster ratio or ipcr – the index page cluster ratio for the object/index pair
- data row cluster ratio or drcr – the data row cluster ratio for the object/index pair
- large io efficiency or lgio – the large I/O efficiency for the object/index pair
- space utilization or sput – the space utilization for the object/index pair

Examples

Example 1 Selects the space utilization for the titleidind index of the titles table:

```
select derived_stat("titles", "titleidind", "space utilization")
```

Example 2 Selects the data page cluster ratio for index ID 2 of the titles table. Note that you can use either `"dpcr"` or `"data page cluster ratio"`:

```
select derived_stat("titles", 2, "dpcr")
```

Example 3 Statistics are reported for the entire object, as neither the partition ID nor name is not specified:

```
1> select derived_stat(object_id("t1"), 2, "drcr")
2> go

---------------------------
                   0.576923
```

Example 4 Reports the statistic for the partition tl_928003396:

```
1> select derived_stat(object_id("t1"), 0, "t1_928003306", "drcr")
2> go

 ---------------------------
                    1.000000

(1 row affected)
```

Example 5 Selects derived statistics for all indexes of a given table, using data from syspartitions:

```
select convert(varchar(30), name) as name, indid,
    convert(decimal(5, 3), derived_stat(id, indid, 'sput')) as 'sput',
    convert(decimal(5, 3), derived_stat(id, indid, 'dpcr')) as 'dpcr',
    convert(decimal(5, 3), derived_stat(id, indid, 'drcr')) as 'drcr',
```

```
    convert(decimal(5, 3), derived_stat(id, indid, 'lgio')) as 'lgio'
from syspartitions where id = object_id('titles')
go
 name                           indid  sput     dpcr     drcr     lgio
 ------------------------------ ------ -------- -------- -------- --------
 titleidind_2133579608               1    0.895    1.000    1.000    1.000
 titleind_2133579608                 2    0.000    1.000    0.688    1.000

(2 rows affected)
```

Example 6 Selects derived statistics for all indexes and partitions of a partitioned table. Here, mymsgs_rr4 is a roundrobin partitioned table that is created with a global index and a local index.

```
1> select * into mymsgs_rr4 partition by roundrobin 4 lock datarows
2> from master..sysmessages
2> go
(7597 rows affected)
1> create clustered index mymsgs_rr4_clustind on mymsgs_rr4(error, severity)
2> go
1> create index mymsgs_rr4_ncind1 on mymsgs_rr4(severity)
2> go
1> create index mymsgs_rr4_ncind2 on mymsgs_rr4(langid, dlevel) local index
2> go

2> update statistics mymsgs_rr4
1>

2> select convert(varchar(10), object_name(id)) as name,
3>      (select convert(varchar(20), i.name) from sysindexes i
4>       where i.id = p.id and i.indid = p.indid),
5> convert(varchar(30), name) as ptnname, indid,
6> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'sput')) as 'sput',
7> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'dpcr')) as 'dpcr',
8> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'drcr')) as 'drcr',
9> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'lgio')) as 'lgio'
10> from syspartitions p
11> where id = object_id('mymsgs_rr4')
 name                        ptnname                    indid sput dpcr drcr lgio
---------------------------- -------------------------- ----- ---- ---- ---- ----
mymsgs_rr4 mymsgs_rr4          mymsgs_rr4_786098810         0 0.90 1.000 1.00 1.000
mymsgs_rr4 mymsgs_rr4          mymsgs_rr4_802098867         0 0.90 1.000 1.00 1.000
mymsgs_rr4 mymsgs_rr4          mymsgs_rr4_818098924         0 0.89 1.000 1.00 1.000
mymsgs_rr4 mymsgs_rr4          mymsgs_rr4_834098981         0 0.90 1.000 1.00 1.000
mymsgs_rr4 mymsgs_rr4_clustind mymsgs_rr4_clustind_850099038 2 0.83 0.995 1.00 1.000
mymsgs_rr4 mymsgs_rr4_ncind1   mymsgs_rr4_ncind1_882099152   3 0.99 0.445 0.88 1.000
mymsgs_rr4 mymsgs_rr4_ncind2   mymsgs_rr4_ncind2_898099209   4 0.15 1.000 1.00 1.000
mymsgs_rr4 mymsgs_rr4_ncind2   mymsgs_rr4_ncind2_914099266   4 0.88 1.000 1.00 1.000
mymsgs_rr4 mymsgs_rr4_ncind2  mymsgs_rr4_ncind2_930099323  4 0.877 1.000 1.000 1.000
```

```
mymsgs_rr4 mymsgs_rr4_ncind2  mymsgs_rr4_ncind2_946099380  4 0.945 0.993 1.000 1.000
```

Example 7 Selects derived statistics for all allpages-locked tables in the current database:

```
2> select convert(varchar(10), object_name(id)) as name
3>     (select convert(varchar(20), i.name) from sysindexes i
4>      where i.id = p.id and i.indid = p.indid),
5> convert(varchar(30), name) as ptnname, indid,
6> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'sput')) as 'sput',
7> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'dpcr')) as 'dpcr',
8> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'drcr')) as 'drcr',
9> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'lgio')) as 'lgio'
10> from syspartitions p
11> where lockscheme(id) = "allpages"
12>   and (select o.type from sysobjects o where o.id = p.id) = 'U'
```

```
 name                              ptnname                     indid sput dpcr drcr lgio
----------- ----------------- --------------------------- ----- ---- ---- ---- ----
 stores     stores            stores_18096074              0 0.276 1.000 1.000 1.000
 discounts  discounts         discounts_50096188           0 0.075 1.000 1.000 1.000
 au_pix     au_pix            au_pix_82096302              0 0.000 1.000 1.000 1.000
 au_pix     tau_pix           tau_pix_82096302             255 NULL NULL NULL NULL
 blurbs     blurbs            blurbs_114096416             0 0.055 1.000 1.000 1.000
 blurbs     tblurbs           tblurbs_114096416            255 NULL NULL NULL NULL
 t1apl      t1apl             t1apl_1497053338             0 0.095 1.000 1.000 1.000
 t1apl      t1apl             t1apl_1513053395             0 0.082 1.000 1.000 1.000
 t1apl      t1apl             t1apl_1529053452             0 0.095 1.000 1.000 1.000
 t1apl      t1apl_ncind       t1apl_ncind_1545053509       2 0.149 0.000 1.000 1.000
 t1apl      t1apl_ncind_local t1apl_ncind_local_1561053566 3 0.066 0.000 1.000 1.000
 t1apl      t1apl_ncind_local t1apl_ncind_local_1577053623 3 0.057 0.000 1.000 1.000
 t1apl      t1apl_ncind_local t1apl_ncind_local_1593053680 3 0.066 0.000 1.000 1.000
 authors    auidind           auidind_1941578924           1 0.966 0.000 1.000 1.000
 authors    aunmind           aunmind_1941578924           2 0.303 0.000 1.000 1.000
 publishers pubind            pubind_1973579038            1 0.059 0.000 1.000 1.000
 roysched   roysched          roysched_2005579152          0 0.324 1.000 1.000 1.000
 roysched   titleidind        titleidind_2005579152        2 0.777 1.000 0.941 1.000
 sales      salesind          salesind_2037579266          1 0.444 0.000 1.000 1.000
 salesdetai salesdetail       salesdetail_2069579380       0 0.614 1.000 1.000 1.000
 salesdetai titleidind        titleidind_2069579380        2 0.518 1.000 0.752 1.000
 salesdetai salesdetailind    salesdetailind_2069579380    3 0.794 1.000 0.726 1.000
 titleautho taind             taind_2101579494             1 0.397 0.000 1.000 1.000
 titleautho auidind           auidind_2101579494           2 0.285 0.000 1.000 1.000
 titleautho titleidind        titleidind_2101579494        3 0.223 0.000 1.000 1.000
 titles     titleidind        titleidind_2133579608        1 0.895 1.000 1.000 1.000
 titles     titleind          titleind_2133579608          2 0.402 1.000 0.688 1.000

(27 rows affected)
```

Usage

- derived_stat returns a double precision value.

- The values returned by derived_stat match the values presented by the optdiag utility.
- If the specified object or index does not exist, derived_stat returns NULL.
- Specifying an invalid statistic type results in an error message.
- Using the optional *partition_name* or *partition_id* reports the requested statistic for the target partition; otherwise, derived_stat reports the statistic for the entire object.
- Instead of consuming resources, derived_stat discards the descriptor for an object that is not already in the cache.
- If you provide:
    - Four arguments – derived_stat uses the third argument as the partition, and returns derived statistics on the fourth argument.
    - Three arguments – derived_stat assumes you did not specifiy a partition, and returns derived statistic specified by the third argument.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for derived_stat differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must be the table owner or have manage database permission to execute derived_stat
Granular permissions disabled	With granular permissions disabled, you must be the table owner or be a user with sa_role to execute derived_stat.

See also

Document *Performance and Tuning Guide* for:

- "Access Methods and Query Costing for Single Tables"
- "Statistics Tables and Displaying Statistics with optdiag"

Utility optdiag

difference

Description: Returns the difference between two soundex values.

Syntax: difference(*expr1*,*expr2*)

Parameters:

expr1
is a character-type column name, variable, or constant expression of char, varchar, nchar, nvarchar, or unichar type.

expr2
is another character-type column name, variable, or constant expression of char, varchar, nchar, nvarchar, or unichar type.

Examples:

Example 1

```
select difference("smithers", "smothers")

---------
4
```

Example 2

```
select difference("smothers", "brothers")

---------
2
```

Usage:

- difference, a string function, returns an integer representing the difference between two soundex values.
- The difference function compares two strings and evaluates the similarity between them, returning a value from 0 to 4. The best match is 4.

  The string values must be composed of a contiguous sequence of valid single- or double-byte roman letters.
- If *expr1* or *expr2* is NULL, returns NULL.
- If you give a varchar expression is given as one parameter and a unichar expression as the other, the varchar expression is implicitly converted to unichar (with possible truncation).

Standards: ANSI SQL – Compliance level: Transact-SQL extension.

Permissions: Any user can execute difference.

See also:

Documentation *Transact-SQL Users Guide*

Function soundex

dol_downgrade_check

Description

Returns the number of data-only-locked (DOL) tables in the specified database that contain variable-length columns wider than 8191 bytes. Returns 0 when there are no wide, variable-length columns and you can safely perform the downgrade.

Syntax

dol_downgrade_check('*database_name*', *target_version*)

Parameters

database_name
name or ID of the database you are checking. *database_name* may be a qualified object name (for example, mydb.dbo.mytable).

target_version
integer version of Adaptive Server to which you are downgrading (for example, version 15.0.3 is 1503).

Examples

Checks DOL tables in the pubs2 database for wide, variable-length columns so you can downgrade to version 15.5:

```
select dol_downgrade_check('pubs2', 1550)
```

Usage

- Returns zero (success) if the target version is 15.7 or later, indicating that no work is necessary.
- If you specify a qualified table, but do not indicate the database to which it belongs, dol_downgrade_check checks the current database.

Permissions

The permission checks for dol_downgrade_check differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must be the database owner or have manage database permission to execute dol_downgrade_check.
Granular permissions disabled	With granular permissions disabled, you must be the database owner or be a user with sa_role to execute dol_downgrade_check.

exp

Description

Calculates the value that results from raising the constant to the specified power.

Syntax

exp(*approx_numeric*)

Parameters

approx_numeric
is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

Examples

```
select exp(3)
--------------------
            20.085537
```

Usage

exp, a mathematical function, returns the exponential value of the specified value.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute exp.

See also

Documentation *Transact-SQL Users Guide*

Functions log, log10, power

floor

Description

Returns the largest integer that is less than or equal to the specified value.

Syntax

floor(*numeric*)

Parameters

numeric

is any exact numeric (numeric, dec, decimal, tinyint, smallint, int, or bigint), approximate numeric (float, real, or double precision), or money column, variable, constant expression, or a combination of these.

Examples

Example 1

```
select floor(123)

-----------
        123
```

Example 2

```
select floor(123.45)

-------
    123
```

Example 3

```
select floor(1.2345E2)

--------------------
         123.000000
```

Example 4

```
select floor(-123.45)

-------
   -124
```

Example 5

```
select floor(-1.2345E2)

--------------------
        -124.000000
```

Example 6

```
select floor($123.45)

------------------------
                 123.00
```

Usage

floor, a mathematical function, returns the largest integer that is less than or equal to the specified value. Results are of the same type as the numeric expression.

For numeric and decimal expressions, the results have a precision equal to that of the expression and a scale of 0.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute floor.

See also

Documentation *Transact-SQL Users Guide*

Functions abs, ceiling, round, sign

get_appcontext

Description

Returns the value of the attribute in a specified context. get_appcontext is provided by the Application Context Facility (ACF).

Syntax

get_appcontext (“*context_name*”, “*attribute_name*”)

Parameters

context_name
is a row specifying an application context name, saved as datatype char(30).

attribute_name
is a row specifying an application context attribute name, saved as char(30).

Examples

Example 1 Shows VALUE1 returned for ATTR1.

```
select get_appcontext("CONTEXT1", "ATTR1")
--------------
VALUE1
```

ATTR1 does not exist in CONTEXT2:

```
select get_appcontext("CONTEXT2", "ATTR1")
```

Example 2 Shows the result when a user without appropriate permissions attempts to get the application context.

```
select get_appcontext("CONTEXT1", "ATTR2", "VALUE1")
Select permission denied on built-in get_appcontext, database dbid
-----------
-1
```

Usage

- This function returns 0 for success and -1 for failure.
- If the attribute you require does not exist in the application context, get_appcontext returns NULL.
- get_appcontext saves attributes as char datatypes. If you are creating an access rule that compares the attribute value to other datatypes, the rule should convert the char data to the appropriate datatype.
- All arguments for this function are required.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for get_appcontext differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must have select permission on get_appcontext to execute the function.
Granular permissions disabled	With granular permissions disabled, you must have select permission on get_appcontext or be a user with sa_role to execute the function.

See also

For more information on the ACF, see "Row-level access control" in Chapter 11, "Managing User Permissions" of the *System Administration Guide*.

Functions get_appcontext, list_appcontext, rm_appcontext, set_appcontext

getdate

Description Returns the current system date and time.

Syntax getdate()

Parameters None.

Examples **Example 1** Assumes a current date of November 25, 1995, 10:32 a.m.:

```
select getdate()
```

```
Nov 25 1995 10:32AM
```

Example 2 Assumes a current date of November:

```
select datepart(month, getdate())
```

```
11
```

Example 3 Assumes a current date of November:

```
select datename(month, getdate())
```

```
November
```

Usage getdate, a date function, returns the current system date and time.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute getdate.

See also **Datatypes** Date and time datatypes

Documentation *Transact-SQL Users Guide*

Functions dateadd, datediff, datename, datepart

get_internal_date

Description Returns the current date and time from the internal clock maintained by Adaptive Server.

Syntax get_internal_date

Examples **Example 1** The system clock is synchronized with the Adaptive Server internal clock. Current system date: January 20, 2007, 5:04AM:

```
select get_internal_date()
Jan 20 2007 5:04AM
```

Example 2 The system clock is not synchronized with the Adaptive Server internal clock. Current system date: August 27, 2007, 1:08AM.

```
select get_internal_date()
Aug 27 2007 1:07AM
```

Usage

get_internal_date may return a different value than getdate. getdate returns the system clock value, while get_internal_date returns the value of the server's internal clock.

At startup, Adaptive Server initializes its internal clock with the current value of the operating system clock, and increments it based on regular updates from the operating system.

Adaptive Server periodically synchronizes the internal clock with the operating system clock. The two typically differ by a maximum of one minute.

Adaptive Server uses the internal clock value to maintain the date of object creation, timestamps for transaction log records, and so on. To retrieve such values, use get_internal_date rather than getdate.

Permissions

Any user can execute get_internal_date

See also

getdate

getutcdate

Description

Returns a date and time where the value is in Universal Coordinated Time (UTC). getutcdate is calculated each time a row is inserted or selected.

Syntax

getutcdate()

Examples

```
insert t1 (c1, c2, c3) select c1, getutcdate(),
getdate() from t2)
```

See also

Functions biginttohex, convert

has_role

Description
Returns information about whether the user has been granted the specified role.

Syntax
has_role ("*role_name*", *option*)

Parameters

role_name
is the name of a system or user-defined role.

option
allows you to limit the scope of the information returned. Currently, the only option supported is 1, which suppresses auditing.

Examples

Example 1 Creates a procedure to check if the user is a System Administrator:

```
create procedure sa_check as
if (has_role("sa_role", 0) > 0)
begin
    print "You are a System Administrator."
    return(1)
end
```

Example 2 Checks that the user has been granted the System Security Officer role:

```
select has_role("sso_role", 1)
```

Example 3 Checks that the user has been granted the Operator role:

```
select has_role("oper_role", 1)
```

Usage

- has_role functions the same way proc_role does. Beginning with Adaptive Server version 15.0, Sybase supports—and recommends—that you use has_role instead of proc_role. You need not, hoever, convert all of your existing uses of proc_role to has_role.
- has_role, a system function, checks whether an invoking user has been granted, and has activated, the specified role.
- has_role returns 0 if the user has:
  - Not been granted the specified role
  - Not been granted a role which contains the specified role
  - Been granted, but has not activated, the specified role
- has_role returns 1 if the invoking user has been granted, and has activated, the specified role.
- has_role returns 2 if the invoking user has a currently active role, which contains the specified role.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute has_role.

See also

Commands alter role, create role, drop role, grant, set, revoke

Documentation *Transact-SQL Users Guide*

Functions mut_excl_roles, role_contain, role_id, role_name, show_role

hash

Description

Produces a fixed-length hash value expression.

Syntax

hash(*expression* , [*algorithm*])

Parameters

expression

is the value to be hashed. This can be a column name, variable, constant expression, or any combination of these that evaluates to a single value. It cannot be image, text, unitext, or off-row Java datatypes. Expression is usually a column name. If expression is a character constant, it must be enclosed in quotes.

algorithm

is the algorithm used to produce the hash value. A character literal (not a variable or column name) that can take the values of either md5 or sha1, 2 (meaning md5 binary), or 3 (meaning sha1 binary). If omitted, md5 is used.

Algorithm	**Results in**
hash(*expression*, ‘md5’)	A varchar 32-byte string. md5 (Message Digest Algorithm 5) is the cryptographic hash function with a 128-bit hash value.
hash(*expression*)	A varchar 32-byte string
hash(*expression*, ‘sha1’)	A varchar 40-byte string sha1 (Secure Hash Algorithm) is the cryptographic hash function with a 160-bit hash value.
hash(*expression*, 2)	A varbinary 16-byte value (using the md5 algorithm)
hash(*expression*, 3)	A varbinary 20-byte value (using the sha1 algorithm)

Examples

This example shows how a seal is implemented. The existence of a table called “atable” and with columns id, sensitive_field and tamper seal.

```
update atable set tamper_seal=hash(convert(varchar(30),
id) + sensitive_field+@salt, 'sha1')
```

Usage

When specified as a character literal, *algorithm* is not case-sensitive—“md5”, “Md5” and “MD5” are equivalent. However, if *expression* is specified as a character datatype then the value is case sensitive. “Time,” “TIME,” and “time” will produce different hash values.

If *algorithm* is a character literal, the result is a varchar string. For “md5” this is a 32-byte string containing the hexadecimal representation of the 128-bit result of the hash calculation. For “sha1” this is a 40-byte string containing the hexadecimal representation of the 160-bit result of the hash calculation.

If *algorithm* is an integer literal, the result is a varbinary value. For 2, this is a 16-byte value containing the 128-bit result of the hash calculation. For 3, this is a 20-byte value containing the 160-bit result of the hash calculation.

Note Trailing null values are trimmed by Adaptive Server when inserted into varbinary columns.

Individual bytes that form *expression* are fed into the hash algorithm in the order they appear in memory. For many datatypes order is significant. For example, the binary representation of the 4-byte INT value 1 will be 0x00, 0x00, 0x00, 0x01 on MSB-first (big-endian) platforms and 0x01, 0x00, 0x00, 0x00 on LSB-first (little-endian) platforms. Because the stream of bytes is different between platforms, the hash value is different as well. Use hashbytes function to achieve platform independent hash value.

Note The hash algorithms MD5 and SHA1 are no longer considered entirely secure by the cryptographic community. As for any such algorithm, you should be aware of the risks of using MD5 or SHA1 in a security-critical context.

Standards: SQL92- and SQL99-compliant

Permissions: Any user can execute hash.

See also: See also hashbytes for platform independent hash values.

hashbytes

Description

Produces a fixed-length, hash value expression.

Syntax

hashbytes(*algorithm*, *expression*[, *expression...*] [, using *options*])

Parameters

expression[, *expression*...]

is the value to be hashed. This value can be a column name, variable, constant expression, or a combination of these that produces a single value. It cannot be image, text, unitext, or off-row Java datatypes.

algorithm

is the algorithm used to produce the hash value. A character literal (not a variable or a column name) that can take the values "md5", "sha", "sha1", or "ptn".

- Md5 (Message Digest Algorithm 5) – is the cryptographic hash algorithm with a 128 bit hash value. hashbytes('md5', *expression*[,...]) results in a varbinary 16-byte value.
- Sha-Sha1 (Secure Hash Algorithm) – is the cryptographic hash algorithm with a 160-bit hash value. hashbytes('shal', *expression*[,...]) results in a varbinary 20-byte value.
- Ptn – The partition hash algorithm with 32-bit hash value. The *using* clause is ignored for the 'ptn' algorithm. hashbytes(*'ptn'*, *expression*[,...]) results in an unsigned int 4-byte value.
- using – Orders bytes for platform independence. The optional using clause can precede the following option strings:
  - lsb – all byte-order dependent data is normalized to little-endian byte-order before being hashed.
  - msb – all byte-order dependent data is normalized to big-endian byte-order before being hashed.
  - unicode – character data is normalized to unicode (UTF–16) before being hashed.

Note A UTF – 16 string is similar to an array of short integers. Because it is byte-order dependent, Sybase suggest for platform independence you use lsb or msb in conjunction with UNICODE.

  - unicode_lsb – a combination of unicode and lsb.
  - unicode_msb – a combination of unicode and msb.

Examples

Example 1 Seals each row of a table against tampering. This example assumes the existence of a user table called “xtable” and col1, col2, col3 and tamper_seal.

```
update xtable set tamper_seal=hashbytes('sha1', col1,
col2, col4, @salt)
--
declare @nparts unsigned int
select @nparts= 5
select hashbytes('ptn', col1, col2, col3) % nparts from
xtable
```

Example 2 Shows how col1, col2, and col3 will be used to partition rows into five partitions.

```
alter table xtable partition by hash(col1, col2, col3) 5
```

Usage

The algorithm parameter is not case-sensitive; “md5,” “Md5” and “MD5” are all equivalent. However, if the *expression* is specified as a character datatype, the value is case sensitive. “Time,” “TIME,” and “time” will produce different hash values.

Note Trailing null values are trimmed by Adaptive Server when inserting into varbinary columns.

In the absence of a using clause, the bytes that form *expression* are fed into the hash algorithm in the order they appear in memory. For many datatypes, order is significant. For example, the binary representation of the 4-byte INT value 1 will be 0x00, 0x00, 0x00, 0x01, on MSB-first (big-endian) platforms and 0x01, 0x00, 0x00, 0x00 on LSB-first (little-endian) platforms. Because the stream of bytes is different for different platforms, the hash value is different as well.

With the using clause, the bytes that form *expression* can be fed into the hashing algorithm in a platform-independent manner. The using clause can also be used to transform character data into Unicode so that the hash value becomes independent of the server’s character configuration.

Note The hash algorithms MD5 and SHA1 are no longer considered entirely secure by the cryptographic community. Be aware of the risks of using MD5 or SHA1 in a security-critical context.

Standards

SQL92- and SQL99-compliant

Permissions

Any user can execute hashbyte.

See also

See also hash for platform dependent hash values.

hextobigint

Description

Returns the bigint value equivalent of a hexadecimal string

Syntax

hextobigint(*hexadecimal_string*)

Parameters

hexadecimal_string
is the hexadecimal value to be converted to an big integer; must be a character-type column, variable name, or a valid hexadecimal string, with or without a "0x" prefix, enclosed in quotes.

Examples

The following example converts the hexadecimal string 0x7fffffffffffffff to a big integer.

```
1> select hextobigint("0x7fffffffffffffff")
2> go
--------------------
9223372036854775807
```

Usage

- hextobigint, a datatype conversion function, returns the platform-independent integer equivalent of a hexadecimal string.
- Use the hextobigint function for platform-independent conversions of hexadecimal data to integers. hextobigint accepts a valid hexadecimal string, with or without a "0x" prefix, enclosed in quotes, or the name of a character-type column or variable.

  hextobigint returns the bigint equivalent of the hexadecimal string. The function always returns the same bigint equivalent for a given hexadecimal string, regardless of the platform on which it is executed.

See also

Functions biginttohex, convert, inttohex, hextoint

hextoint

Description

Returns the platform-independent integer equivalent of a hexadecimal string.

Syntax

hextoint(*hexadecimal_string*)

Parameters

hexadecimal_string

is the hexadecimal value to be converted to an integer; must be a character-type column, variable name, or a valid hexadecimal string, with or without a “0x” prefix, enclosed in quotes.

Examples

Returns the integer equivalent of the hexadecimal string “0x00000100”. The result is always 256, regardless of the platform on which it is executed:

```
select hextoint ("0x00000100")
```

Usage

- hextoint, a datatype conversion function, returns the platform-independent integer equivalent of a hexadecimal string.
- Use the hextoint function for platform-independent conversions of hexadecimal data to integers. hextoint accepts a valid hexadecimal string, with or without a “0x” prefix, enclosed in quotes, or the name of a character-type column or variable.

  hextoint returns the integer equivalent of the hexadecimal string. The function always returns the same integer equivalent for a given hexadecimal string, regardless of the platform on which it is executed.
- For more information about datatype conversion, see the *Transact-SQL Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute hextoint.

See also

Functions biginttohex, convert, inttohex

host_id

Description

Returns the client computer's operating system process ID for the current Adaptive Server client.

Syntax

host_id()

Parameters

None.

Examples

In this example, the name of the client computer is "ephemeris" and the process ID on the computer "ephemeris" for the Adaptive Server client process is 2309:

```
select host_name(), host_id()
----------------------------- ----------------------
 ephemeris                    2309
```

The following is the process information, gathered using the UNIX ps command, from the computer "ephemeris" showing that the client in this example is "isql" and its process ID is 2309:

```
2309 pts/2    S  0:00 /work/as125/OCS-12_5/bin/isql
```

Usage

host_id, a system function, returns the host process ID of the client process (not the server process).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute host_id.

See also

Documentation *Transact-SQL Users Guide*

Function host_name

host_name

Description
Displays the current host computer name of the client process.

Syntax
host_name()

Parameters
None.

Examples

```
select host_name()

------------------------------
violet
```

Usage
host_name, a system function, returns the current host computer name of the client process (not the server process).

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute host_name.

See also
Documentation *Transact-SQL Users Guide*

Function host_id

instance_id

Description — (Cluster environments only) Returns the id of the named instance, or the instance from which it is issued if you do not provide a value for *name*.

Syntax — instance_id([*name*])

Parameters — *name*
name of the instance whose ID you are researching.

Examples — Returns the ID of the local instance:

```
select instance_id()
```

Usage — Returns the ID of the instance named "myserver1":

```
select instance_id(myserver1)
```

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute instance_id.

identity_burn_max

Description
Tracks the identity burn max value for a given table. This function returns only the value; it does not perform an update.

Syntax
identity_burn_max(*table_name*)

Parameters
table_name
is the name of the table selected.

Examples

```
select identity_burn_max("t1")

t1
------------
51
```

Usage
identity_burn_max tracks the identity burn max value for a given table.

Permissions
The permission checks for identity_burn_max differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must be the table owner or have manage database permission to execute identity_burn_max.
Granular permissions disabled	With granular permissions disabled, you must be the database owner or table owner, or be a user with sa_role to execute identity_burn_max.

index_col

Description

Displays the name of the indexed column in the specified table or view to a maximum of 255 bytes in length.

Syntax

index_col(*object_name*, *index_id*, *key_#*[, *user_id*])

Parameters

object_name
is the name of a table or view. The name can be fully qualified (that is, it can include the database and owner name). It must be enclosed in quotes.

index_id
is the number of *object_name*'s index. This number is the same as the value of sysindexes.indid.

key_#
is a key in the index. This value is between 1 and sysindexes.keycnt for a clustered index and between 1 and sysindexes.keycnt+1 for a nonclustered index.

user_id
is the owner of *object_name*. If you do not specify *user_id*, it defaults to the caller's user ID.

Examples

Finds the names of the keys in the clustered index on table t4:

```
declare @keycnt integer
select @keycnt = keycnt from sysindexes
     where id = object_id("t4")
     and indid = 1
while @keycnt > 0
begin
     select index_col("t4", 1, @keycnt)
     select @keycnt = @keycnt - 1
end
```

Usage

- index_col, a system function, returns the name of the indexed column.
- index_col returns NULL if *object_name* is not a table or view name.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute index_col.

See also

Documentation *Transact-SQL Users Guide*

Function object_id

System procedure sp_helpindex

index_colorder

Description

Returns the column order.

Syntax

index_colorder(*object_name*, *index_id*, *key_#*[, *user_id*])

Parameters

object_name
is the name of a table or view. The name can be fully qualified (that is, it can include the database and owner name). It must be enclosed in quotes.

index_id
is the number of *object_name*'s index. This number is the same as the value of sysindexes.indid.

key_#
is a key in the index. Valid values are 1 and the number of keys in the index. The number of keys is stored in sysindexes.keycnt.

user_id
is the owner of *object_name*. If you do not specify *user_id*, it defaults to the caller's user ID.

Examples

Returns "DESC" because the salesind index on the sales table is in descending order:

```
select name, index_colorder("sales", indid, 2)
from sysindexes
where id = object_id ("sales")
and indid > 0

name
------------------------- -------------------------
salesind                  DESC
```

Usage

- index_colorder, a system function, returns "ASC" for columns in ascending order or "DESC" for columns in descending order.
- index_colorder returns NULL if *object_name* is not a table name or if *key_#* is not a valid key number.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute index_colorder.

See also

Documentation *Transact-SQL Users Guide*

index_name

Description

Returns an index name, when you provide the index ID, the database ID, and the object on which the index is defined.

Syntax

index_name(*dbid*, *objid*, *indid*)

Parameters

dbid
is the ID of the database on which the index is defined.

objid
is the ID of the table (in the specified database) on which the index is defined.

indid
is the ID of the index for which you want a name.

Examples

Example 1

Illustrates the normal usage of this function.

```
select index_name(db_id("testdb"),
    object_id("testdb...tab_apl"),1)
------------
```

Example 2 Illustrates the output if the database ID is NULL and you use the current database ID.

```
select index_name(NULL,object_id("testdb..tab_apl"),1)
--------------------------
```

Example 3 Displays the table name if the index ID is 0, and the database ID and object ID are valid.

```
select index_name(db_id("testdb"),
    object_id("testdb..tab_apl"),1)
-----------------------------
```

Usage

- index_name uses the current database ID, if you pass a NULL value in the *dbid* parameter
- index_name returns NULL if you pass a NULL value in the *dbid* parameter.
- index_name returns the object name, if the index ID is 0, and you pass valid inputs for the object ID and the database ID.

Permissions

Any user can execute this function.

See also

db_id, object_id

inttohex

Description
Returns the platform-independent hexadecimal equivalent of the specified integer.

Syntax
inttohex(*integer_expression*)

Parameters
integer_expression
is the integer value to be converted to a hexadecimal string.

Examples

```
select inttohex (10)

--------
0000000A
```

Usage

- inttohex, a datatype conversion function, returns the platform-independent hexadecimal equivalent of an integer, without a "0x" prefix.
- Use the inttohex function for platform-independent conversions of integers to hexadecimal strings. inttohex accepts any expression that evaluates to an integer. It always returns the same hexadecimal equivalent for a given expression, regardless of the platform on which it is executed.
- For more information about datatype conversion, see the *Transact-SQL Guide*.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute inttohex.

See also
Functions convert, hextobigint, hextoint

isdate

Description

Determines whether an input expression is a valid datetime value.

Syntax

isdate(*character_expression*)

Parameters

character_expression
is a character-type variable, constant expression, or column name.

Examples

Example 1 Determines if the string 12/21/2005 is a valid datetime value:

```
select isdate('12/21/2005')
```

Example 2 Determines if stor_id and date in the sales table are valid datetime values:

```
select isdate(stor_id), isdate(date) from sales
---- ----
0    1
```

store_id is not a valid datetime value, but date is.

Usage

Returns 1 if the expression is a valid datetime value; returns 0 if it is not. Returns 0 for NULL input.

is_quiesced

Description

Indicates whether a database is in quiesce database mode. is_quiesced returns 1 if the database is quiesced and 0 if it is not.

Syntax

is_quiesced(*dbid*)

Parameters

dbid
is the database ID of the database.

Examples

Example 1 Uses the test database, which has a database ID of 4, and which is not quiesced:

```
1> select is_quiesced(4)
2> go

-----------
          0

(1 row affected)
```

Example 2 Uses the test database after running quiesce database to suspend activity:

```
1> quiesce database tst hold test
2> go
1> select is_quiesced(4)
2> go

-----------
          1

(1 row affected)
```

Example 3 Uses the test database after resuming activity using quiesce database:

```
1> quiesce database tst release
2> go
1> select is_quiesced(4)
2> go

 -----------
           0

(1 row affected)
```

Example 4 Executes a select statement with is_quiesced using an invalid database ID:

```
1>select is_quiesced(-5)
```

```
2> go

 -----------
       NULL

(1 row affected)
```

Usage

- is_quiesced has no default values. You see an error if you execute is_quiesced without specifying a database.
- is_quiesced returns NULL if you specify a database ID that does not exist.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute is_quiesced.

See also

Command quiesce database

is_sec_service_on

Description

Determines whether a particular security service is enabled. Returns 1 if the service is enabled; otherwise, returns 0.

Syntax

is_sec_service_on(*security_service_nm*)

Parameters

security_service_nm
is the name of the security service.

Examples

```
select is_sec_service_on("unifiedlogin")
```

Usage

- Use is_sec_service_on to determine whether a given security service is active during the session.
- To find valid names of security services, execute:

```
select * from syssecmechs
```

The result might look something like:

```
sec_mech_name available_service
------------- --------------------
dce           unifiedlogin
dce           mutualauth
dce           delegation
dce           integrity
dce           confidentiality
dce           detectreplay
dce           detectseq
```

The available_service column displays the security services that are supported by Adaptive Server.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute is_sec_service_on.

See also

Function show_sec_services

is_singleusermode

Description
Returns 0 if Adaptive Server is not running in single-user mode. Returns 1 if Adaptive Server is running in single-user mode.

Syntax
is_singleusermode()

Parameters
is_singleusermode includes no parameters.

Examples
This example shows a server running in single-user mode:

```
select is_singleusermode()

-----------
          1
```

Permissions
Any user can run is_singleusermode

isnull

Description

Substitutes the value specified in *expression2* when *expression1* evaluates to NULL.

Syntax

isnull(*expression1*, *expression2*)

Parameters

expression
is a column name, variable, constant expression, or a combination of any of these that evaluates to a single value. It can be of any datatype, including unichar. *expression* is usually a column name. If *expression* is a character constant, it must be enclosed in quotes.

Examples

Returns all rows from the titles table, replacing null values in price with 0:

```
select isnull(price,0)
from titles
```

Usage

- isnull, a system function, substitutes the value specified in *expression2* when *expression1* evaluates to NULL. For general information about system functions, see *Transact-SQL Users Guide*.
- The datatypes of the expressions must convert implicitly, or you must use the convert function.
- If *expression1* parameter is a char datatype and *expression2* is a literal parameter, the results from your select statement that includes isnull differ based on whether you enable literal autoparameterization. To avoid this situation, do not autoparameterize char datatype literals within isnull().

  Stored procedures that use isnull() with the same expression settings may also exhibit unexpected behavior. If this occurs, re-create the corresponding autoparameterizations.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute isnull.

See also

Documentation "Controlling literal parameterization" in *Performance and Tuning Series: Query Processing and Abstract Plans*, *System Administration Guide: Volume 1*, *Transact-SQL Users Guide*

Function convert

isnumeric

Description

Determines if an expression is a valid numeric datatype.

Syntax

isnumeric (*character_expression*)

Parameters

character_expression
is a character-type variable, constant expression, or a column name.

Examples

Example 1 Determines if the values in the postalcode column of the authors table contains valid numeric datatypes:

```
select isnumeric(postalcode) from authors
```

Example 2 Determines if the value $100.12345 is a valid numeric datatype:

```
select isnumeric("$100.12345")
```

Usage

- Returns 1 if the input expression is a valid integer, floating point number, money or decimal type; returns 0 if it does not or if the input is a NULL value. A return value of 1 guarantees that you can convert the expression to one of these numeric types.
- You can include currency symbols as part of the input.

instance_name

Description

(Cluster environments only) Returns the name for the Adaptive Server whose id you provide, or the name of the Adaptive Server from which it is issued if you do not provide a value for *id*.

Syntax

instance_name([*id*])

Parameters

id

is the ID of the Adaptive Server whose name you are researching.

Examples

Returns the name of the instance with an ID of 12:

```
select instance_name(12)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute instance_name.

lc_id

Description

(Cluster environments only) Returns the ID of the logical cluster whose name you provide, or the current logical cluster if you do not provide a name.

Syntax

lc_id(*logical_cluster_name*)

Parameters

logical_cluster_name
is the name of the logical cluster.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute lc_id

lc_name

Description

(Cluster environments only) Returns the name of the logical cluster whose id you provide, or the current logical cluster if you do not provide an ID.

Syntax

lc_name([*logical_cluster_ID*])

Parameters

logical_cluster_ID
is the ID of the logical cluster.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute lc_name.

lct_admin

Description

Manages the last-chance threshold (LCT). It returns the current value of the LCT and aborts transactions in a transaction log that has reached its LCT.

Syntax

```
lct_admin({{"lastchance" | "logfull" | "reserved_for_rollbacks"},
        database_id
        |"reserve", {log_pages | 0 }
        | "abort", process-id [, database-id]})
```

Parameters

lastchance
: creates a LCT in the specified database.

logfull
: returns 1 if the LCT has been crossed in the specified database and 0 if it has not.

reserved_for_rollbacks
: determines the number of pages a database currently reserved for rollbacks.

database_id
: specifies the database.

reserve
: obtains either the current value of the LCT or the number of log pages required for dumping a transaction log of a specified size.

log_pages
: is the number of pages for which to determine a LCT.

0
: returns the current value of the LCT. The size of the LCT in a database with separate log and data segments does not vary dynamically. It has a fixed value, based on the size of the transaction log. The LCT varies dynamically in a database with mixed log and data segments.

abort
: aborts transactions in a database where the transaction log has reached its last-chance threshold. Only transactions in log-suspend mode can be aborted.

logsegment_freepages
: describes the free space available for the log segment. This is the total value of free space, not per-disk.

process-id
: is the ID (*spid*) of a process in log-suspend mode. A process is placed in log-suspend mode when it has open transactions in a transaction log that has reached its last-chance threshold (LCT).

database-id
is the ID of a database with a transaction log that has reached its LCT. If *process-id* is 0, all open transactions in the specified database are terminated.

Examples

Example 1 Creates the log segment last-chance threshold for the database with dbid 1. It returns the number of pages at which the new threshold resides. If there was a previous last-chance threshold, it is replaced:

```
select lct_admin("lastchance", 1)
```

Example 2 Returns 1 if the last-chance threshold for the database with dbid of 6 has been crossed, and 0 if it has not:

```
select lct_admin("logfull", 6)
```

Example 3 Calculates and returns the number of log pages that would be required to successfully dump the transaction log in a log containing 64 pages:

```
select lct_admin("reserve", 64)

-----------
         16
```

Example 4 Returns the current last-chance threshold of the transaction log in the database from which the command was issued:

```
select lct_admin("reserve", 0)
```

Example 5 Aborts transactions belonging to process 83. The process must be in log-suspend mode. Only transactions in a transaction log that has reached its LCT are terminated:

```
select lct_admin("abort", 83)
```

Example 6 Aborts all open transactions in the database with dbid of 5. This form awakens any processes that may be suspended at the log segment last-chance threshold:

```
select lct_admin("abort", 0, 5)
```

Example 7 Determines the number of pages reserved for rollbacks in the pubs2 database, which has a dbid of 5:

```
select lct_admin("reserved_for_rollbacks", 5, 0)
```

Example 8 Describes the free space available for a database with a dbid of 4:

```
select lct_admin("logsegment_freepages", 4)
```

Usage

- lct_admin, a system function, manages the log segment's last-chance threshold. For general information about system functions, see *Transact-SQL Users Guide*.

- If lct_admin(“lastchance”, *dbid*) returns zero, the log is not on a separate segment in this database, so no last-chance threshold exists.
- Whenever you create a database with a separate log segment, the server creates a default last chance threshold that defaults to calling sp_thresholdaction. This happens even if a procedure called sp_thresholdaction does not exist on the server at all.

  If your log crosses the last-chance threshold, Adaptive Server suspends activity, tries to call sp_thresholdaction, finds it does not exist, generates an error, then leaves processes suspended until the log can be truncated.
- To terminate the oldest open transaction in a transaction log that has reached its LCT, enter the ID of the process that initiated the transaction.
- To terminate all open transactions in a transaction log that has reached its LCT, enter 0 as the *process-id*, and specify a database ID in the *database-id* parameter.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for lct_admin differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must have manage database permission to execute lct_admin abort. Any user can execute the other lct_admin options.
Granular permissions disabled	With granular permissions disabled, you must be a user with sa_role to execute lct_admin abort. Any user can execute the other lct_admin options.

See also

Document *System Administration Guide*.

Command dump transaction

Function curunreservedpgs

System procedure sp_thresholdaction

left

Description
Returns a specified number of characters on the left end of a character string.

Syntax
left(*character_expression*, *integer_expression*)

Parameters
character_expression
is the character string from which the characters on the left are selected.

integer_expression
is the positive integer that specifies the number of characters returned. An error is returned if *integer_expression* is negative.

Examples
Example 1 Returns the five leftmost characters of each book title.

```
use pubs
select left(title, 5) from titles
order by title_id

-----
The B
Cooki
You C
.....
Sushi

(18 row(s) affected)
```

Example 2 Returns the two leftmost characters of the character string “abcdef”:

```
select left("abcdef", 2)
---------
ab
(1 row(s) affected)
```

Usage

- *character_expression* can be of any datatype (except text or image) that can be implicitly converted to varchar or nvarchar. *character_expression* can be a constant, variable, or a column name. You can explicitly convert character_expression using convert.
- left is equivalent to substring(*character_expression*, *1*, *integer_expression*). For more information on this function, see substring on page 292.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute left.

See also
Datatypes varchar, nvarchar

Functions len, str_replace, substring

len

Description

Returns the number of characters, not the number of bytes, of a specified string expression, excluding trailing blanks.

Syntax

len(*string_expression*)

Parameters

string_expression
is the string expression to be evaluated.

Examples

Returns the characters

```
select len(notes) from titles
where title_id = "PC9999"
-----------
39
```

Usage

This function is the equivalent of char_length(*string_expression*).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute len.

See also

Datatypes char, nchar, varchar, nvarchar

Functions char_length, left, str_replace

license_enabled

Description

Returns 1 if a feature's license is enabled, 0 if the license is not enabled, or NULL if you specify an invalid license name.

Syntax

license_enabled("ase_server" | "ase_ha" | "ase_dtm" | "ase_java" |
    "ase_asm")

Parameters

ase_server
  specifies the license for Adaptive Server.

ase_ha
  specifies the license for the Adaptive Server high availability feature.

ase_dtm
  specifies the license for Adaptive Server distributed transaction management features.

ase_java
  specifies the license for the Java in Adaptive Server feature.

ase_asm
  specifies the license for Adaptive Server advanced security mechanism.

Examples

Indicates that the license for the Adaptive Server distributed transaction management feature is enabled:

```
select license_enabled("ase_dtm")
--------------
             1
```

Usage

For information about installing license keys for Adaptive Server features, see your installation guide.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute license_enabled.

See also

Documents Installation guide for your platform

System procedure sp_configure

list_appcontext

Description

Lists all the attributes of all the contexts in the current session. list_appcontext is provided by the ACF.

Syntax

list_appcontext(["*context_name*"])

Parameters

context_name
is an optional argument that names all the application context attributes in the session.

Examples

Example 1 Shows the results when a user with appropriate permissions attempts to list the application contexts:

```
select list_appcontext ([context_name])
```

```
Context Name: (CONTEXT1)
Attribute Name: (ATTR1) Value: (VALUE2)
Context Name: (CONTEXT2)
Attribute Name: (ATTR1) Value: (VALUE1)
```

Example 2 Shows the results when a user without appropriate permissions attempts to list the application contexts:

```
select list_appcontext()
```

```
Select permission denied on built-in list_appcontext,
database DBID
--------
-1
```

Usage

- This function returns 0 for success.
- Since built-in functions do not return multiple result sets, the client application receives list_appcontext returns as messages.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

The permission checks for list_appcontext differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must have select permission on list_appcontext to execute the function.
Granular permissions disabled	With granular permissions disabled, you must have select permission on list_appcontext or be a user with sa_role to execute the function.

See also

For more information on the ACF, see “Row-level access control” in Chapter 11, “Managing User Permissions” of the *System Administration Guide*.

Functions get_appcontext, list_appcontext, rm_appcontext, set_appcontext

locator_literal

Description
Identifies a binary value as a locator literal.

Syntax
locator_literal(*locator_type*, *literal_locator*)

Parameters
locator_type
is the type of locator. One of text_locator, image_locator, or unitext_locator.

literal_locator
is the actual binary value of a LOB locator.

Examples
This example inserts an image LOB that is stored in memory and identified by its locator in the imagecol column of my_table. Use of the locator_literal function ensures that Adaptive Server correctly interprets the binary value as a LOB locator.

```
insert my_table (imagecol) values
    (locator_literal(image_locator,
0x9067ef4501000000001000000040100400800000000)
```

Usage
Use locator_literal to ensure that Adaptive Server correctly identifies the literal locator value and does not misinterpret it as an image or other binary.

Permissions
Any user can execute locator_literal.

See also
Commands deallocate locator, truncate lob

Transact-SQL functions locator_valid, return_lob, create_locator

locator_valid

Description
Determines whether a LOB locator is valid.

Syntax
locator_valid (*locator_descriptor*)

Parameters
locator_descriptor
is a valid representation of a LOB locator: a host variable, a local variable, or the literal binary value of a locator.

Examples
Validates the locator value 0x9067ef4501000000001000000040100400800000000:

```
locator_valid (0x9067ef4501000000001000000040100400800000000)
-------------------
                  1
```

Usage

- locator_valid returns 1 if the specified locator is valid. Otherwise, it returns 0 (zero).
- A locator becomes invalid if invalidated by the deallocate lob command, or at the termination of a transaction.

Permissions
Any user can execute locator_valid.

See also
Commands deallocate locator, truncate lob

Transact-SQL functions locator_literal, return_lob, create_locator

lockscheme

Description

Returns the locking scheme of the specified object as a string.

Syntax

lockscheme(*object_name*)

lockscheme(*object_id* [, *db_id*])

Parameters

object_name
is the name of the object that the locking scheme returns. *object_name* can also be a fully qualified name.

db_id
the ID of the database specified by *object_id*.

object_id
the ID of the object that the locking scheme returns.

Examples

Example 1 Selects the locking scheme for the titles table in the current database:

```
select lockscheme("titles")
```

Example 2 Selects the locking scheme for *object_id* 224000798 (in this case, the titles table) from database ID 4 (the pubs2 database):

```
select lockscheme(224000798, 4)
```

Example 3 Returns the locking scheme for the titles table (*object_name* in this example is fully qualified):

```
select lockscheme(tempdb.ownerjoe.titles)
```

Usage

- lockscheme returns varchar(11) and allows NULLs.
- lockscheme defaults to the current database if you:
  - Do not provide a fully qualified *object_name*.
  - Do not provide a *db_id*.
  - Provide a null for *db_id*.
- If the specified object is not a table, lockscheme returns the string “not a table.”

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute lockscheme.

log

Description Calculates the natural logarithm of the specified number.

Syntax log(*approx_numeric*)

Parameters *approx_numeric*

is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

Examples

```
select log(20)

--------------------
           2.995732
```

Usage log, a mathematical function, returns the natural logarithm of the specified value.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute log.

See also **Documentation** *Transact-SQL Users Guide*

Functions log10, power

log10

Description

Calculates the base 10 logarithm of the specified number.

Syntax

log10(*approx_numeric*)

Parameters

approx_numeric
is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

Examples

```
select log10(20)

--------------------
            1.301030
```

Usage

log10, a mathematical function, returns the base 10 logarithm of the specified value.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute log10.

See also

Documentation *Transact-SQL Users Guide*

Functions log, power

lower

Description Converts uppercase characters to lowercase.

Syntax lower(*char_expr* | *uchar_expr*)

Parameters *char_expr*

is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr

is a character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

```
select lower(city) from publishers

--------------------
boston
washington
berkeley
```

Usage

- lower, a string function, converts uppercase to lowercase, returning a character value.
- lower is the inverse of upper.
- If *char_expr* or *uchar_expr* is NULL, returns NULL.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute lower.

See also **Documentation** *Transact-SQL Users Guide*

Function upper

lprofile_id

Description	Returns the login profile ID of the specified login profile name, or the login profile ID of the login profile associated with the current login or the specified login name.
Syntax	lprofile_id(*name*)
Parameters	*name* (Optional) login profile name or a login name. If you specify a login profile name, lprofile_id returns the corresponding login profile ID. If you specify a login name, lprofile_id returns the associated (if any) login profile ID. If you do not specify *name*, lprofile_id returns the login profile ID of the current login.
Permissions	The permission checks for lprofile_id differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, any user can execute lprofile_id to return the ID of their own profile. You must have manage any login profile permission to execute lprofile_id and retrieve the profile ID of other users.
Granular permissions disabled	With granular permissions disabled, any user can execute lprofile_id to return the ID of their own profile. You must be a user with sso_role to execute lprofile_id and retrieve the profile ID of other users.

lprofile_name

Description	Returns the login profile name of the specified login profile ID, or the login profile name of the login profile associated with the current login or the specified login suid.
Syntax	lprofile_id(*ID*)
Parameters	*ID* (Optional) login profile ID or a login suid. If you specify a a login profile ID, lprofile_name returns its corresponding login profile name. If you specify a login suid, lprofile_name returns the associated (if any) login profile name. If you do not specify *ID*, lprofile_name returns the login profile name of the current login.
Permissions	The permission checks for lprofile_name differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, any user can execute lprofile_name to return the profile name of their own profile. You must have manage any login profile permission to execute lprofile_name and retrieve the profile name of other users.
Granular permissions disabled	With granular permissions disabled, any user can execute lprofile_name to return the profile name of their own profile. You must have sso_role to execute lprofile_name and retrieve the profile name of other users.

ltrim

Description

Trims the specified expression of leading blanks.

Syntax

ltrim(*char_expr* | *uchar_expr*)

Parameters

char_expr
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

```
select ltrim("    123")

-------
123
```

Usage

- ltrim, a string function, removes leading blanks from the character expression. Only values equivalent to the space character in the current character set are removed.
- If *char_expr* or *uchar_expr* is NULL, returns NULL.
- For Unicode expressions, returns the lowercase Unicode equivalent of the specified expression. Characters in the expression that have no lowercase equivalent are left unmodified.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute ltrim.

See also

Documentation *Transact-SQL Users Guide*

Function rtrim

max

Description
Returns the highest value in an expression.

Syntax
max(*expression*)

Parameters
expression
is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery.

Examples
Example 1 Returns the maximum value in the discount column of the salesdetail table as a new column:

```
select max(discount) from salesdetail

--------------------
            62.200000
```

Example 2 Returns the maximum value in the discount column of the salesdetail table as a new row:

```
select discount from salesdetail
compute max(discount)
```

Usage

- max, an aggregate function, finds the maximum value in a column or expression. For general information about aggregate functions, see *Transact-SQL Users Guide*.
- You can use max with exact and approximate numeric, character, and datetime columns; you cannot use it with bit columns. With character columns, max finds the highest value in the collating sequence. max ignores null values. max implicitly converts char datatypes to varchar, and unichar datatypes to univarchar, stripping all trailing blanks.
- unichar data is collated according to the default Unicode sort order.
- max preserves the trailing zeros in varbinary data.
- max returns a varbinary datatype from queries on binary data.
- Adaptive Server goes directly to the end of the index to find the last row for max when there is an index on the aggregated column, unless:
    - The *expression* not a column.
    - The column is not the first column of an index.
    - There is another aggregate in the query.
    - There is a group by or where clause.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute max.

See also
Commands compute clause, group by and having clauses, select, where clause

Functions avg, min

migrate_instance_id

Description
If issued in the context of a migrated task, migrate_instance_id returns the instance ID of the instance from which the caller migrated. If issued in the context of a nonmigrated task, migrate_instance_id returns the ID of the current instance.

Syntax
migrate_instance_id()

Usage
You may issue migrate_instance_id from a login trigger to determine which statements in the trigger should be executed in case a task is migrated.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
You must be the system administrator to issue migrate_instance_id.

min

Description — Returns the lowest value in a column.

Syntax — min(*expression*)

Parameters — *expression*

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name. For more information, see "Expressions" on page 349.

Examples

```
select min(price) from titles
    where type = "psychology"

------------------------
                    7.00
```

Usage

- min, an aggregate function, finds the minimum value in a column.
- You can use min with numeric, character, time, and datetime columns, but not with bit columns. With character columns, min finds the lowest value in the sort sequence. min implicitly converts char datatypes to varchar, and unichar datatypes to univarchar, stripping all trailing blanks. min ignores null values. distinct is not available, since it is not meaningful with min.
- min preserves the trailing zeros in varbinary data.
- min returns a varbinary datatype from queries on binary data.
- unichar data is collated according to the default Unicode sort order.
- Adaptive Server goes directly to the first qualifying row for min when there is an index on the aggregated column, unless:
    - The *expression* is not a column.
    - The column is not the first column of an index.
    - There is another aggregate in the query.
    - There is a group by clause.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute min.

See also — **Commands** compute clause, group by and having clauses, select, where clause

Documentation *Transact-SQL Users Guide*

Functions avg, max

month

Description
Returns an integer that represents the month in the datepart of a specified date.

Syntax
month(*date_expression*)

Parameters
date_expression
is an expression of type datetime, smalldatetime, date, or a character string in a datetime format.

Examples
Returns the integer 11:

```
day("11/02/03")
----------
11
```

Usage
month(*date_expression*) is equivalent to datepart(*mm*, *date_expression*).

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute month.

See also
Datatypes datetime, smalldatetime, date

Functions datepart, day, year

mut_excl_roles

Description

Returns information about the mutual exclusivity between two roles.

Syntax

mut_excl_roles (*role1, role2* [membership | activation])

Parameters

role1
is one user-defined role in a mutually exclusive relationship.

role2
is the other user-defined role in a mutually exclusive relationship.

level
is the level (membership or activation) at which the specified roles are exclusive.

Examples

Shows that the admin and supervisor roles are mutually exclusive:

```
alter role admin add exclusive membership supervisor
select
mut_excl_roles("admin", "supervisor", "membership")

-----------
          1
```

Usage

mut_excl_roles, a system function, returns information about the mutual exclusivity between two roles. If the System Security Officer defines role1 as mutually exclusive with role2 or a role directly contained by role2, mut_excl_roles returns 1. If the roles are not mutually exclusive, mut_excl_roles returns 0.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

Any user can execute mut_excl_roles.

See also

Commands alter role, create role, drop role, grant, set, revoke

Documentation *Transact-SQL Users Guide*

Functions proc_role, role_contain, role_id, role_name

System procedures sp_activeroles, sp_displayroles, sp_role

newid

Description

Generates human-readable, globally unique IDs (GUIDs) in two different formats, based on arguments you provide. The length of the human-readable format of the GUID value is either 32 bytes (with no dashes) or 36 bytes (with dashes).

Syntax

newid([*optionflag*])

Parameters

option flag

- 0, or no value – the GUID generated is human-readable (varchar), but does not include dashes. This argument, which is the default, is useful for converting values into varbinary.
- -1 – the GUID generated is human-readable (varchar) and includes dashes.
- -0x0 – returns the GUID as a varbinary.
- Any other value for newid returns NULL.

Examples

Example 1 Creates a table with varchar columns 32 bytes long, then uses newid with no arguments with the insert statement:

```
create table t (UUID varchar(32))
go
insert into t values (newid())
insert into t values (newid())
go
select * from t

UUID
--------------------------------
f81d4fae7dec11d0a76500a0c91e6bf6
7cd5b7769df75cefe040800208254639
```

Example 2 Produces a GUID that includes dashes:

```
select newid(1)
------------------------------------
b59462af-a55b-469d-a79f-1d6c3c1e19e3
```

Example 3 Creates a default that converts the GUID format without dashes to a varbinary(16) column:

```
create table t (UUID_VC varchar(32), UUID
varbinary(16))
go
create default default_guid
as
```

```
strtobin(newid())
go
sp_bindefault default_guid, "t.UUID"
go
insert t (UUID_VC) values (newid())
go
```

Example 4 Returns a new GUID of type varbinary for every row that is returned from the query:

```
select newid(0x0) from sysobjects
```

Example 5 Uses newid with the varbinary datatype:

```
sp_addtype binguid, "varbinary(16)"
create default binguid_dflt
as
newid(0x0)
sp_bindefault "binguid_dflt","binguid"
create table T1 (empname char(60), empid int, emp_guid
binguid)
insert T1 (empname, empid) values ("John Doe", 1)
insert T1 (empname, empid( values ("Jane Doe", 2)
```

Usage

- newid generates two values for the globally unique ID (GUID) based on arguments you pass to newid. The default argument generates GUIDs without dashes. By default newid returns new values for every filtered row.
- You can use newid in defaults, rules, and triggers, similar to other functions.
- Make sure the length of the varchar column is at least 32 bytes for the GUID format without dashes, and at least 36 bytes for the GUID format with dashes. The column length is truncated if it is not declared with these minimum required lengths. Truncation increases the probability of duplicate values.
- An argument of zero is equivalent to the default.
- You can use the GUID format without dashes with the strtobin function to convert the GUID value to 16-byte binary data. However, using strtobin with the GUID format with dashes results in NULL values.
- Because GUIDs are globally unique, they can be transported across domains without generating duplicates.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute newid.

next_identity

Description
Retrieves the next identity value that is available for the next insert.

Syntax
next_identity(*table_name*)

Parameters
table_name
identifies the table being used.

Examples
Updates the value of c2 to 10. The next available value is 11.

```
select next_identity ("t1")
t1
--------
11
```

Usage

- next_identity returns the next value to be inserted by this task. In some cases, if multiple users are inserting values into the same table, the actual value reported as the next value to be inserted is different from the actual value inserted if another user performs an intermediate insert.
- next_identity returns a varchar chararcter to support any precision of the identity column. If the table is a proxy table, a non-user table, or the table does not have identity property, NULL is returned.

Permissions
The permission checks for next_identity differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must be the table owner, or be a user with select permission on the identity column of the table, or have manage database permission to execute next_identity.
Granular permissions disabled	With granular permissions disabled, you must be the database owner or table owner, or be a user with sa_role, or have select permission on the identity column of the table to execute next_identity.

nullif

Description

Allows SQL expressions to be written for conditional values. nullif expressions can be used anywhere a value expression can be used; alternative for a case expression.

Syntax

nullif(*expression*, *expression*)

Parameters

nullif

compares the values of the two expressions. If the first expression equals the second expression, nullif returns NULL. If the first expression does not equal the second expression, nullif returns the first expression.

expression

is a column name, a constant, a function, a subquery, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators. For more information about expressions, see “Expressions” on page 349.

Examples

Selects the titles and type from the titles table. If the book type is UNDECIDED, nullif returns a NULL value:

```
select title,
    nullif(type, "UNDECIDED")
from titles
```

Alternately, you can also write:

```
select title,
    case
        when type = "UNDECIDED" then NULL
        else type
    end
from titles
```

Usage

- nullif expression alternate for a case expression.
- nullif expression simplifies standard SQL expressions by allowing you to express a search condition as a simple comparison instead of using a when...then construct.
- You can use nullif expressions anywhere an expression can be used in SQL.
- At least one result of the case expression must return a non-null value. For example the following results in an error message:

```
select price, coalesce (NULL, NULL, NULL)
from titles
All result expressions in a CASE expression must not be NULL.
```

- If your query produces a variety of datatypes, the datatype of a case expression result is determined by datatype hierarchy, as described in "Datatypes of mixed-mode expressions" on page 6. If you specify two datatypes that Adaptive Server cannot implicitly convert (for example, char and int), the query fails.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Anyone can execute nullif.

See also

Commands case, coalesce, select, if...else, where clause

object_attr

Description

Reports the table's current logging mode, depending on the session, table and database-wide settings.

Syntax

object_attr(*table_name*, *string*)

Parameters

table_name

name of a table.

string

is the name of the table property that has been queried. The supported string values are:

- dml_logging – returns the DML logging level for the requested object in effect, based on the explicitly set table or database's DML logging level.
- dml_logging for session – returns the DML logging level for the current session, taking into account the user running object_attr, the table's schema, and rules regarding multistatement transactions, and so on. The return value from this argument can be different for different users, and different for statements or transactions for the same user.
- compression – returns the compression type for the requested object.
- help – prints a list of supported string arguments.

Examples

Example 1 To determine which properties he or she can query, the user runs:

```
select object_attr('sysobjects', 'help')
Usage: object_attr('tabname', 'attribute')

List of options in attributes table:
     0 : help
     1 : dml_logging
     2 : dml_logging for session
     3 : compression
```

`dml_logging` reports the statically-defined dml_logging level for the object, and `dml_logging for session` reports the runtime logging level chosen for the object, depending on the database-specific and session settings.

Example 2 The default logging mode of a table with durability set to full:

```
select object_attr("pubs2..authors",
         "dml_logging")

Returns: FULL
```

Example 3 If the session has logging disabled for all tables, the logging mode returned for tables owned by this user is minimal.

```
select object_attr("pubs2..authors",
         "dml_logging")

Returns: FULL

SET DML_LOGGING MINIMAL
go

select object_attr("pubs2..authors",
         "dml_logging for session")

Returns: MINIMAL
```

Example 4 If a table has been altered to explicitly select minimal logging, object_attr returns a value of minimal, even if the session and database-wide logging is FULL.

```
create database testdb WITH DML_LOGGING = FULL
go

create table non_logged_table (...)
WITH DML_LOGGING = MINIMAL
go

select object_attr("non_logged_table",
         "dml_logging")
Returns: MINIMAL
```

Example 5 Changes a table's logging from full to minimal. If you explicitly create a table with full logging, you can reset the logging to minimal during a session if you are the table owner or a user with the sa_role:

1. Create the testdb database with minimal logging:

   ```
   create database testdb
   with dml_logging = minimal
   ```

2. Create a table with dml_logging set to full:

   ```
   create table logged_table(...)
   with dml_logging = full
   ```

3. Reset the logging for the session to minimal:

   ```
   set dml_logging minimal
   ```

4. The logging for the table is minimal:

```
select object_attr("logged_table",
         "dml_logging for session")
--------------------
minimal
```

Example 6 If you create a table without specifying the logging mode, changing the session's logging mode also changes the table's logging mode:

- Create the table normal_table:

```
create table normal_table
```

- Check the session's logging:

```
select object_attr("normal_table", "dml_logging")
-------------------------
FULL
```

- Set the session logging to minimal:

```
set dml_logging minimal
```

- The table's logging is set to minimal:

```
select object_attr("normal_table",
         "dml_logging for session")
-----------------------------
minmimal
```

Example 7 The logging mode returned by object_attr depends on the table you run it against. In this example, user joe runs a script, but the logging mode Adaptive Server returns changes. The tables joe.own_table and mary.other_table use a full logging mode:

```
select object_attr("own_table","dml_logging")
--------------
          FULL
```

When joe runs object_attr against mary.other_table, this table is also set to full:

```
select object_attr("mary.other_table", "dml_logging")
--------------
          FULL
```

If joe changes the dml_logging to minimal, only the logging mode of the tables he owns are affected:

```
set dml_logging minimal
select object_attr("own_table", "dml_logging for
session")
--------------
       MINIMAL
```

Tables owned by other users will continue to operate in their default logging mode:

```
Select object_attr("mary.other_table", "dml_logging for
session")
--------------
          FULL
```

Example 8 Identify the run-time choices of logging a new show_exec_info, and use it in the SQL batch:

1. Enable set showplan:

   ```
   set showplan on
   ```

2. Enable the set command:

   ```
   set show_exec_info on
   ```

3. Set dml_logging to minimal and check the logging with object_attr:

```
set dml_logging minimal
select object_attr("logged_table", "dml_logging for session")
```

4. Delete rows from the table:

   ```
   delete logged_table
   ```

   Adaptive Server reports the table's logging mode at run-time with show_exec_info parameter.

Usage

- The return type is a varchar, which appropriately returns the value of the property (for example, on or off) depending on the property queried for.
- The logging mode as reported by extensions to showplan output might be affected at run-time, if there are set statements in the same batch, preceding the execution of the DML, which changes the logging mode of the table
- The return value is the value NULL (not the string "NULL") for an unknown property.
- A special-type of string parameter, help prints to the session's output all the currently supported properties for object_attr. This allows you to quickly identify which properties are supported by object_attr.

object_id

Description

Returns the object ID of the specified object.

Syntax

object_id(*object_name*)

Parameters

object_name
is the name of a database object, such as a table, view, procedure, trigger, default, or rule. The name can be fully qualified (that is, it can include the database and owner name). Enclose the *object_name* in quotes.

Examples

Example 1

```
select object_id("titles")

-----------
  208003772
```

Example 2

```
select object_id("master..sysobjects")

-----------
          1
```

Usage

- object_id, a system function, returns the object's ID. Object IDs are stored in the id column of sysobjects.
- Instead of consuming resources, object_id discards the descriptor for an object that is not already in the cache.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute object_id.

See also

Documentation *Transact-SQL Users Guide*

Functions col_name, db_id, object_name

System procedure sp_help

object_name

Description

Returns the name of the object with the object ID you specify; up to 255 bytes in length.

Syntax

object_name(*object_id*[, *database_id*])

Parameters

object_id
is the object ID of a database object, such as a table, view, procedure, trigger, default, or rule. Object IDs are stored in the id column of sysobjects.

database_id
is the ID for a database if the object is not in the current database. Database IDs are stored in the db_id column of sysdatabases.

Examples

Example 1

```
select object_name(208003772)

------------------------------
titles
```

Example 2

```
select object_name(1, 1)

------------------------------
sysobjects
```

Usage

object_name, a system function, returns the object's name.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute object_name.

See also

Documentation *Transact-SQL Users Guide*

Functions col_name, db_id, object_id

System procedure sp_help

object_owner_id

Description

Returns an object's owner ID.

Syntax

object_owner_id(*object_id*[, *database_id*])

Parameters

object_id
is the ID of the object you are investigating.

database_id
is the ID of the database in which the object resides.

Examples

Selects the owner's ID for an object with an ID of 1, in the database with the ID of 1 (the master database):

```
select object_owner_id(1,1)
```

Permissions

Any user can execute object_owner_id.

pagesize

Description

Returns the page size, in bytes, for the specified object.

Syntax

```
pagesize(object_name[, ])
pagesize(object_id[,db_id[, index_id]])
```

Parameters

object_name
is the object name of the page size of this function returns.

index_name
indicates the index name of the page size you want returned.

object_id
is the object ID of the page size this function returns.

db_id
is the database ID of the object.

index_id
is the index ID of the object you want returned.

Examples

Example 1 Selects the page size for the title_id index in the current database.

```
select pagesize("title", "title_id")
```

Example 2 Returns the page size of the data layer for the object with *object_id* 1234 and the database with a *db_id* of 2 (the previous example defaults to the current database):

```
select pagesize(1234,2, null)
select pagesize(1234,2)
select pagesize(1234)
```

Example 3 All default to the current database:

```
select pagesize(1234, null, 2)
select pagesize(1234)
```

Example 4 Selects the page size for the titles table (object_id 224000798) from the pubs2 database (db_id 4):

```
select pagesize(224000798, 4)
```

Example 5 Returns the page size for the nonclustered index's pages table mytable, residing in the current database:

```
pagesize(object_id('mytable'), NULL, 2)
```

Example 6 Returns the page size for object titles_clustindex from the current database:

```
select pagesize("titles", "titles_clustindex")
```

Usage

- pagesize defaults to the data layer if you do not provide an index name or *index_id* (for example, `select pagesize("t1")`) if you use the word “null” as a parameter (for example, `select pagesize("t1", null)`.
- If the specified object is not an object requiring physical data storage for pages (for example, if you provide the name of a view), pagesize returns 0.
- If the specified object does not exist, pagesize returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute pagesize.

partition_id

Description

Returns the partition ID of the specified data or index partition name.

Syntax

partition_id(*table_name*, *partition_name*[,*index_name*])

Parameters

table_name
is the name for a table.

partition_name
is the partition name for a table partition or an index partition.

index_name
is the name of the index of interest.

Examples

Example 1 Returns the partition ID corresponding to the partition name testtable_ptn1 and index id 0 (the base table). The testtable must exist in the current database:

```
select partition_id("testtable", "testtable_ptn1")
```

Example 2 Returns the partition ID corresponding to the partition name testtable_clust_ptn1 for the index name clust_index1. The testtable must exist in the current database:

```
select partition_id("testtable", "testtable_clust_ptn1", "clust_index1")
```

Example 3 This is the same as the previous example, except that the user need not be in the same database as where the target table is located:

```
select partition_id("mydb.dbo.testtable", "testtable_clust_ptn1",
    "clust_index1")
```

Usage

You must enclose *table_name*, *partition_name* and *index_name* in quotes.

See also

Functions data_pages, object_id, partition_name, reserved_pages, row_count, used_pages

partition_name

Description

Returns the explicit name of a new partition, partition_name returns the partition name of the specified data or index partition id.

Syntax

partition_name(*indid*, *ptnid*[, *dbid*])

Parameters

indid
is the index ID for the target partition.

ptnid
is the ID of the target partition.

dbid
is the database ID for the target partition. If you do not specify this parameter, the target partition is assumed to be in the current database.

Examples

Example 1 Returns the partition name for the given partition ID belonging to the base table (with an index ID of 0). The lookup is done in the current database because it does not specify a database ID:

```
select partition_name(0, 1111111111)
```

Example 2 Returns the partition name for the given partition ID belonging to the clustered index (index ID of 1 is specified) in the testdb database.

```
select partition_name(1, 1212121212, db_id("testdb")
```

Usage

If the search does not find the target partition, the return is NULL.

See also

Functions data_pages, object_id, partition_id, reserved_pages, row_count

partition_object_id

Description
Displays the object ID for a specified partition ID and database ID.

Syntax
partition_object_id(*partition_id* [, *database_id*])

Parameters

partition_id
is the ID of the partition whose object ID is to be retrieved.

database_id
is the database ID of the partition.

Examples

Example 1 Displays the object ID for the partition whose partition ID is 2:

```
select partition_object_id(2)
```

Example 2 Displays the object ID for the partition whose partition ID is 14 and whose database ID is 7:

```
select partition_object_id(14,7)
```

Example 3 Returns a NULL value for the database ID because a NULL value is passed to the function:

```
select partition_object_id( 1424005073, NULL)

 -----------
NULL
(1 row affected)
```

Usage

- partition_object_id uses the current database ID if you do not include a database ID.
- partition_object_id returns NULL if you use a NULL value for the *partition_id*.
- partition_object_id returns a NULL value if you include a NULL value for database ID.
- partition_object_id returns NULL if you provide an invalid or non-existent *partition_id* or *database_id*.

password_random

Description

Generates a pseudorandom password that satisfies the global password complexity checks defined on Adaptive Server. “Pseudorandom” indicates that Adaptive Server is simulating random-like numbers, since no computer generates truly random numbers. The complexity checks are:

- Minimum password length
- Minimum number of:
  - Digits in password
  - Special characters in password
  - Alphabetic characters in password
  - Uppercase characters in password
  - Lowercase characters in password

Syntax

password_random ([*pwdlen*])

Parameters

pwdlen

is an integer that specifies the length of the random password. If you omit pwdlen, Adaptive Server generates a password with a length determined by the 'minimum password length' global option, for which the default value is 6.

Examples

Example 1 Shows the password complexity checks stored in the server:

```
minimum password length:           10
min digits in password:             2
min alpha in password:              4
min upper char in password:         1
min special char in password:      -1
min lower char in password:         1

select password_random()
----------------------
6pY5l6UT]Q
```

Example 2 Shows password complexity checks stored in the server:

```
minimum password length:                     15
minimum digits in password:                   4
minimum alpha in password:                    4
minimum upper-case characters in password: 1
minimum lower-case characters in password: 2
minimum special characters in password:    4
```

```
select password_random(25)
-----------------
S/03iuX[ISi:Y=?8f.[eH%P51
```

Example 3 Updates the password column with random passwords for all employees whose name begins with “A”:

```
update employee
set password = password_random()
where name like 'A%'
```

Example 4 Generates a random password and uses it to create a login account for user “anewman”.

```
declare @password varchar(10)
select @password =               password_random(10)
exec sp_addlogin 'jdoe', @password
```

Example 5 Enclose the random password generated in single or double quotes if using it directly:

```
select @password = password_random(11)
-----------
%k55Mmf/2U2

sp_adlogin 'jdoe','%k55Mmf/2U2'
```

Usage

The passwords generated by password_random() are pseudorandom; to generate truly random passwords, use a stronger random generator.

patindex

Description

Returns the starting position of the first occurrence of a specified pattern.

Syntax

patindex("%*pattern*%", *char_expr*|*uchar_expr*[, using
    {bytes | characters | chars}])

Parameters

pattern

is a character expression of the char or varchar datatype that may include any of the pattern-match wildcard characters supported by Adaptive Server. The % wildcard character must precede and follow *pattern* (except when searching for first or last characters). For a description of the wildcard characters, see "Pattern matching with wildcard characters" on page 371.

char_expr

is a character-type column name, variable, or constant expression of char, varchar, nchar, nvarchar, text_locator, or unitext_locator type.

uchar_expr

is a character-type column name, variable, or constant expression of unichar, or univarchar type.

using

specifies a format for the starting position.

bytes

returns the offset in bytes.

chars or characters

returns the offset in characters (the default).

Examples

Example 1 Selects the author ID and the starting character position of the word "circus" in the copy column:

```
select au_id, patindex("%circus%", copy)
from blurbs
```

```
au_id
 ----------- -----------
 486-29-1786           0
 648-92-1872           0
 998-72-3567          38
 899-46-2035          31
 672-71-3249           0
 409-56-7008           0
```

Example 2

```
select au_id, patindex("%circus%", copy,
```

```
     using chars)
from blurbs
```

Example 3 Finds all the rows in sysobjects that start with "sys" with a fourth character that is "a", "b", "c", or "d":

```
select name
from sysobjects
where patindex("sys[a-d]%", name) > 0
```

```
name
------------------------------
sysalternates
sysattributes
syscharsets
syscolumns
syscomments
sysconfigures
sysconstraints
syscurconfigs
sysdatabases
sysdepends
sysdevices
```

Usage

- patindex, a string function, returns an integer representing the starting position of the first occurrence of *pattern* in the specified character expression, or a 0 if *pattern* is not found.
- You can use patindex on all character data, including text and image data.
- For text, unitext, and image data, if ciphertext is set to 1, then patindex is not supported. An error message appears.
- For text, unitext, and image data, if ciphertext is set to 0, then the byte or character index of the pattern within the plaintext is returned.
- For unichar, univarchar, and unitext, patindex returns the offset in Unicode characters. The pattern string is implicitly converted to UTF-16 before comparison, and the comparison is based on the default unicode sort order configuration. For example, this is what is returned if a unitext column contains row value U+0041U+0042U+d800U+dc00U+0043:

  ```
  select patindex("%C%", ut) from unitable
  -----------
  4
  ```

- By default, patindex returns the offset in characters; to return the offset in bytes (multibyte character strings), specify using bytes.

- Include percent signs before and after *pattern*. To look for *pattern* as the first characters in a column, omit the preceding %. To look for *pattern* as the last characters in a column, omit the trailing %.
- If *char_expr* or *uchar_expr* is NULL, patindex returns 0.
- If you give a varchar expression as one parameter and a unichar expression as the other, the varchar expression is implicitly converted to unichar (with possible truncation).

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute patindex.

See also — **Documentation** *Transact-SQL Users Guide*

Functions charindex, substring

pi

Description
Returns the constant value 3.1415926535897936.

Syntax
pi()

Parameters
None

Examples

```
select pi()

--------------------
           3.141593
```

Usage
pi, a mathematical function, returns the constant value of 3.1415926535897931.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute pi.

See also
Documentation *Transact-SQL Users Guide*

Functions degrees, radians

power

Description

Returns the value that results from raising the specified number to a given power.

Syntax

power(*value*, *power*)

Parameters

value
is a numeric value.

power
is an exact numeric, approximate numeric, or money value.

Examples

```
select power(2, 3)

-----------
          8
```

Usage

power, a mathematical function, returns the value of *value* raised to the power *power*. Results are of the same type as *value*.

In expressions of type numeric or decimal, this function returns precision:38, scale 18.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute power.

See also

Documentation *Transact-SQL Users Guide*

Functions exp, log, log10

proc_role

Description

Returns information about whether the user has been granted a specified role.

Note Sybase supports—and recommends—that you use has_role instead of proc_role. You need not, however, convert your existing uses of proc_role to has_role.

Syntax

proc_role("*role_name*")

Parameters

role_name
is the name of a system or user-defined role.

Examples

Example 1 Creates a procedure to check if the user is a System Administrator:

```
create procedure sa_check as
if (proc_role("sa_role") > 0)
begin
    print "You are a System Administrator."
    return(1)
end
```

Example 2 Checks that the user has been granted the System Security Officer role:

```
select proc_role("sso_role")
```

Example 3 Checks that the user has been granted the Operator role:

```
select proc_role("oper_role")
```

Usage

- Using proc_role with a procedure that starts with “sp_” returns an error.
- proc_role, a system function, checks whether an invoking user has been granted, and has activated, the specified role.
- proc_role returns 0 if the user has:
    - Not been granted the specified role
    - Not been granted a role which contains the specified role
    - Been granted, but has not activated, the specified role
- proc_role returns 1 if the invoking user has been granted, and has activated, the specified role.
- proc_role returns 2 if the invoking user has a currently active role, which contains the specified role.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute proc_role.

See also

Commands alter role, create role, drop role, grant, set, revoke

Documentation *Transact-SQL Users Guide*

Functions mut_excl_roles, role_contain, role_id, role_name, show_role

pssinfo

Description
Returns information from the Adaptive Server process status structure (pss).

Syntax
pssinfo(*spid* | 0, '*pss_field*')

Parameters
spid
is the process ID. When you enter 0, the current process is used.

pss_field
is the process status structure field. Valid values are:

- dn – distinguished name when using LDAP authentication.
- extusername – when using external authentication like (PAM, LDAP), extusername returns the external PAM or LDAP user name used.
- ipaddr – client IP address.
- ipport – client IP port number used for the client connection associated with the user task being queried.
- isolation_level – isolation level for the current session.
- tempdb_pages – number of tempdb pages used.

Examples
Displays the port number for spid number 14

```
select pssinfo(14,'ipport')
----------------
           52039
```

Usage
- The pssinfo function also includes the option to display the external user name and the distinguish name.
- ipport output, combined with ipaddr output, allows you to uniquely identify network traffic between Adaptive Server and the client.

Permissions
The permission checks for pssinfo differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must be the owner of the proccess ID, or have manage server permission to execute pssinfo.
Granular permissions disabled	With granular permissions disabled, you must be the owner of the process ID, or be a user with sa_role or sso_role to execute pssinfo.

radians

Description

Converts degrees to radians. Returns the size, in radians, of an angle with the specified number of degrees.

Syntax

radians(*numeric*)

Parameters

numeric

is any exact numeric (numeric, dec, decimal, tinyint, smallint, or int), approximate numeric (float, real, or double precision), or money column, variable, constant expression, or a combination of these.

Examples

```
select radians(2578)

-----------
         44
```

Usage

radians, a mathematical function, converts degrees to radians. Results are of the same type as *numeric*.

To express numeric or decimal dataypes, this function returns precision: 38, scale 18.

When money datatypes are used, internal conversion to float may cause loss of precision.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute radians.

See also

Documentation *Transact-SQL Users Guide*

Function degrees

rand

Description

Returns a random float value between 0 and 1 using the specified (optional) integer as a seed value.

Syntax

rand([*integer*])

Parameters

integer
is any integer (tinyint, smallint, or int) column name, variable, constant expression, or a combination of these.

Examples

Example 1

```
select rand()

--------------------
          0.395740
```

Example 2

```
declare @seed int
select @seed=100
select rand(@seed)

--------------------
            0.000783
```

Usage

- rand, a mathematical function, returns a random float value between 0 and 1, using the optional integer as a seed value.
- The rand function uses the output of a 32-bit pseudorandom integer generator. The integer is divided by the maximum 32-bit integer to give a double value between 0.0 and 1.0. The rand function is seeded randomly at server start-up, so getting the same sequence of random numbers is unlikely, unless the user first initializes this function with a constant seed value. The rand function is a global resource. Multiple users calling the rand function progress along a single stream of pseudorandom values. If a repeatable series of random numbers is needed, the user must assure that the function is seeded with the same value initially and that no other user calls rand while the repeatable sequence is desired.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute rand.

See also

Datatypes Approximate numeric datatypes

Documentation *Transact-SQL Users Guide*

Functions rand2

rand2

Description
Returns a random value between 0 and 1, which is generated using the specified seed value, and computed for each returned row when used in the select list.

Syntax
rand2([*integer*])

Parameters
integer
is any integer (tinyint, smallint, or int) column name, variable, constant expression, or a combination of these.

Examples
If there are n rows is table t, the following select statement returns n different random values, not just one.

```
select rand2() from t
------------
```

Usage

- rand2, a mathematical function, returns a random float value between 0 and 1, using the optional integer as a seed value. Unlike rand, it is computed for each returned row when it is used in the select list.
- The behavior of rand2 in places other than the select list is currently undefined.
- For more information about the 32-bit pseudorandom integer generator, see the Usage section of rand.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute rand.

See also
Datatypes Approximate numeric datatypes

Documentation *Transact-SQL Users Guide*

Functions rand

replicate

Description

Returns a string consisting of the specified expression repeated a given number of times, or as many as can fit into a 16KB space, whichever is less.

Syntax

replicate(*char_expr* | *uchar_expr*, *integer_expr*)

Parameters

char_expr
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

integer_expr
is any integer (tinyint, smallint, or int) column name, variable, or constant expression.

Examples

```
select replicate("abcd", 3)

------------
abcdabcdabcd
```

Usage

- replicate, a string function, returns a string with the same datatype as *char_expr* or *uchar_expr* containing the same expression repeated the specified number of times or as many times as fits into 16K, whichever is less.
- If *char_expr* or *uchar_expr* is NULL, returns a single NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute replicate.

See also

Documentation *Transact-SQL Users Guide*

Function stuff

reserve_identity

Description

reserve_identity allows a process to reserve a block of identity values for use by that process.

After a process calls reserve_identity to reserve the block of values, subsequent identity values needed by this process are drawn from this reserved pool. When these reserved numbers are exhausted, or if you insert data into a different table, the existing identity options apply. reserve_identity can retain more than one block of identity values, so if inserts to different tables are interleaved by a single process, the next value in a table's reserved block is used.

Reserves a specified size block of identity values for the specified table, which are used exclusively by the calling process. Returns the reserved starting number, and subsequent inserts into the specified table by this process use these values. When the process terminates, any unused values are eliminated.

Syntax

reserve_identity (*table_name*, *number_of_values*)

Parameters

table_name
is the name of the table for which the reservation are made. The name can be fully qualified; that is, it can include the *database_name*, *owner_name*, and *object_name* (in quotes).

number_of_values
is the number of sequential identity values reserved for this process. This must be a positive value that will not cause any of the reserved values to exceed the maximum values for the datatype of the identity column.

Examples

Describes a typical usage scenario for reserve_identity, and assumes that table1 includes col1 (with a datatype of int) and a col2 (an identity column with a datatype of int). This process is for spid 3:

```
select reserve_identity("table1", 5 )
---------------
10
```

Insert values for spids 3 and 4:

```
Insert table1 values(56) -> spid 3
Insert table1 values(48) -> spid 3
Insert table1 values(96) -> spid 3
Insert table1 values(02) -> spid 4
Insert table1 values(84) -> spid 3
```

Select from table table1:

```
select * from table1
```

```
Col1          col2
--------       -----
3              1-> spid 3 reserved 1-5
3              2-> spid 3
3              3-> spid 3
4              6<= spid 4 gets next unreserved value
3              4<= spid 3 continues with reservation
```

The result set shows that spid 3 reservered identity values 1 – 5, spid 4 receives the next unreserved value, and then spid 3 reserves the subsequent identity values.

Usage

- The sp_configure system procedure's "identity reservation size" parameter specifies a server-wide limit on the value passed to the *number_of_values* parameter.
- The return value, *start_value*, is the starting value for the block of reserved identity values. The calling process uses this value for the next insert into the specified table
- reserve_identity allows a process to:
  - Reserve identity values without issuing an insert statement.
  - Know the values reserved prior issuing the insert statement
  - "Grab" different size blocks of identity values, according to need.
  - Better control "over gaps" by reserving only what is needed (that is, they are not restricted by preset server grab size
- Values are automatically used with no change to the insert syntax.
- NULL values are returned if:
  - A negative value or zero is specified as the block size.
  - The table does not exist.
  - The table does not contain an identity column.
- If you issue reserve_identity on a table in which this process has already reserved these identity values, the function succeeds and the most recent group of values is used.
- You cannot use reserve_identity to reserve identity values on a proxy table. Local servers can use reserve_identity on a remote table if the local server calls a remote procedure that calls reserve_identity. Because these reserved values are stored on the remote server but in the session belonging to the local server, subsequent inserts to the remote table use the reserved values.

- If the identity_gap is less than the reserved block size, the reservation succeeds by reserving the specified block size (not an identity_gap size) of values. If these values are not used by the process, this results in potential gaps of up to the specified block size regardless of the identity_gap setting.

Permissions

You must have insert permission on the table to reserve identity values. Permission checks do not differ based on the granular permissions settings.

See also

Procedures sp_configure

reserved_pages

Description

Reports the number of pages reserved for a database, object, or index. The result includes pages used for internal structures.

This function replaces the reserved_pgs function used in Adaptive Server versions earlier than 15.0.

Syntax

reserved_pages(*dbid*, *object_id*[, *indid*[, *ptnid*]])

Parameters

dbid
is the database ID of the database where the target object resides.

object_id
is an object ID for a table.

indid
is the index ID of target index.

ptnid
is the partition ID of target partition.

Examples

Example 1 Returns the number of pages reserved by the object with a object ID of 31000114 in the specified database (including any indexes):

```
select reserved_pages(5, 31000114)
```

Example 2 Returns the number of pages reserved by the object in the data layer, regardless of whether or not a clustered index exists:

```
select reserved_pages(5, 31000114, 0)
```

Example 3 Returns the number of pages reserved by the object in the index layer for a clustered index. This does not include the pages used by the data layer:

```
select reserved_pages(5, 31000114, 1)
```

Example 4 Returns the number of pages reserved by the object in the data layer of the specific partition, which in this case is 2323242432:

```
select reserved_pages(5, 31000114, 0, 2323242432)
```

Example 5 Use one of the following three methods to calculate space in a database with reserved_pages:

- Use case expressions to select a value appropriate for the index you are inspecting, selecting all non-log indexes in sysindexes for this database. In this query:

- The data has a value of “index 0”, and is available when you include the statements `when sysindexes.indid = 0` or `sysindexes.indid = 1`.
- indid values greater than 1 for are indexes. Because this query does not sum the data space into the index count, it does not include a page count for indid of 0.
- Each object has an index entry for index of 0 or 1, never both.
- This query counts index 0 exactly once per table.

```
select
'data rsvd' = sum( case
          when indid > 1 then 0
          else reserved_pages(db_id(), id, 0)
          end ),
'index rsvd' = sum( case
          when indid = 0 then 0
          else reserved_pages(db_id(), id, indid)
          end )
from sysindexes
where id != 8
data rsvd   index rsvd
----------   -----------
       812           1044
```

- Query sysindexes multiple times to display results after all queries are complete:

```
declare @data int,
@dbsize int,
@dataused int,
@indices int,
@indused int
select @data = sum( reserved_pages(db_id(), id, 0) ),
     @dataused = sum( used_pages(db_id(), id, 0) )
from sysindexes
where id != 8
and indid <= 1
select @indices = sum( reserved_pages(db_id(), id, indid) ),
     @indused = sum( used_pages(db_id(), id, indid) )
from sysindexes
where id != 8 and indid > 0
select @dbsize   as 'db size',
@data as 'data rsvd'
db size    data rsvd
----------- -----------
       NULL         820
```

- Query sysobjects for data space information and sysindexes for index information. From sysobjects, select table objects: [S]ystem or [U]ser:

```
declare   @data int,
          @dbsize int,
          @dataused int,
          @indices int,
          @indused int
select @data = sum( reserved_pages(db_id(), id, 0) ),
@dataused = sum( used_pages(db_id(), id, 0) )
from sysobjects
where id != 8
and type in ('S', 'U')
select @indices = sum( reserved_pages(db_id(), id, indid) ),
       @indused = sum( used_pages(db_id(), id, indid) )
from sysindexes
where id != 8
and indid > 0
select   @dbsize as 'db size',
         @data as 'data rsvd',
         @dataused as 'data used',
         @indices as 'index rsvd',
         @indused as 'index used'
db size    data rsvd    data used    index rsvd    index used
---------  -----------  -----------  -----------   ----------
     NULL          812          499         1044          381
```

Usage

- If a clustered index exists on an all-pages locked table, passing an index ID of 0 reports the reserved data pages, and passing an index ID of 1 reports the reserved index pages. All erroneous conditions result in a value of zero being returned.
- reserved_pages counts whatever you specify; if you supply a valid database, object, index (data is "index 0" for every table), it returns the reserved space for this database, object, or index. However, it can also count a database, object, or index multiple times. If you have it count the data space for every index in a table with multiple indexes, you get it counts the data space once for every index. If you sum these results, you get the number of indexes multiplied by the total data space, not the total number of data pages in the object.
- Instead of consuming resources, reserved_pages discards the descriptor for an object that is not already in the cache.
- For Adaptive Server version 15.0 and later, reserved_pages replaces the reserved_pgs function. These are the differences between reserved_pages and reserved_pgs.

- In Adaptive Server versions 12.5 and earlier, Adaptive Server stored OAM pages for the data and index in sysindexes. In Adaptive Server versions 15.0 and later, this information is stored per-partition in sysparitions. Because this information is stored differently, reserved_pages and reserved_pgs require different parameters and have different result sets.
- reserved_pgs required a page ID. If you supplied a value that did not have a matching sysindexes row, the supplied page ID was 0 (for example, the data OAM page of a nonclustered index row). Because 0 was never a valid OAM page, if you supplied a page ID of 0, reserved_pgs returned 0; because the input value is invalid, reserved_pgs could not count anything.

  However, reserved_pages requires an index ID, and 0 is a valid index ID (for example, data is "index 0" for every table). Because reserved_pages can not tell from the context that you do not require it to recount the data space for any index row except indid 0 or 1, it counts the data space every time you pass 0 as an index ID. Because reserved_pages counts this data space once per row, its yields a sum many times the true value.

  These differences are described as:

  - reserved_pgs does not affect the sum if you supply 0 as a value for the page ID for the OAM page input; it just returns a value of 0.
  - If you supply reserved_pages with a value of 0 as the index ID, it counts the data space. Issue reserved_pages only when you want to count the data or you will affect the sum.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute reserved_pgs.

See also **Command** update statistics

Function data_pages, reserved_pages, row_count, used_pages

return_lob

Description

Dereferences a locator, and returns the LOB referenced by that locator.

Syntax

return_lob (*datatype*, *locator_descriptor*)

Parameters

datatype
is the datatype of the LOB. Valid datatypes are:

- text
- unitext
- image

locator_descriptor
is a valid representation of a LOB locator: a host variable, a local variable, or the literal binary value of a locator.

Examples

This example dereferences the locator and returns the LOB referenced by the literal locator value 0x9067ef4501000000001000000040100400800000000.

```
return_lob (text, locator_literal(text_locator,
0x9067ef4501000000001000000040100400800000000))
```

Usage

return_lob overrides the set send_locator on command, and always returns a LOB.

Permissions

Any user can execute return_lob.

See also

Commands deallocate locator, truncate lob

Transact-SQL functions locator_literal, locator_valid, create_locator

reverse

Description: Returns the specified string with characters listed in reverse order.

Syntax: reverse(*expression* | *uchar_expr*)

Parameters:

expression
is a character or binary-type column name, variable, or constant expression of char, varchar, nchar, nvarchar, binary, or varbinary type.

uchar_expr
is a character or binary-type column name, variable, or constant expression of unichar or univarchar type.

Examples:

Example 1

```
select reverse("abcd")

----
dcba
```

Example 2

```
select reverse(0x12345000)

----------
0x00503412
```

Usage:

- reverse, a string function, returns the reverse of *expression*.
- If *expression* is NULL, reverse returns NULL.
- Surrogate pairs are treated as indivisible and are not reversed.

Standards: ANSI SQL – Compliance level: Transact-SQL extension.

Permissions: Any user can execute reverse.

See also:

Documentation *Transact-SQL Users Guide*

Functions lower, upper

right

Description

Returns the part of the character or binary expression starting at the specified number of characters from the right. Return value has the same datatype as the character expression.

Syntax

right(*expression*, *integer_expr*)

Parameters

expression
is a character or binary-type column name, variable, or constant expression of char, varchar, nchar, unichar, nvarchar, univarchar, binary, or varbinary type.

integer_expr
is any integer (tinyint, smallint, or int) column name, variable, or constant expression.

Examples

Example 1

```
select right("abcde", 3)
```

```
 ---
 cde
```

Example 2

```
select right("abcde", 2)
```

```
 --
 de
```

Example 3

```
select right("abcde", 6)
```

```
 -----
 abcde
```

Example 4

```
select right(0x12345000, 3)
```

```
 -------
 0x345000
```

Example 5

```
select right(0x12345000, 2)
```

```
 ------
 0x5000
```

Example 6

```
select right(0x12345000, 6)
```

```
---------
0x12345000
```

Usage

- right, a string function, returns the specified number of characters from the rightmost part of the character or binary expression.
- If the specified rightmost part begins with the second surrogate of a pair (the low surrogate), the return value starts with the next full character. Therefore, one less character is returned.
- The return value has the same datatype as the character or binary expression.
- If *expression* is NULL, right returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

Any user can execute right.

See also

Documentation *Transact-SQL Users Guide*

Functions rtrim, substring

rm_appcontext

Description

Removes a specific application context, or all application contexts. rm_appcontext is provided by the ACF.

Syntax

rm_appcontext("*context_name*", "*attribute_name*")

Parameters

context_name
is a row specifying an application context name. It is saved as datatype char(30).

attribute_name
is a row specifying an application context attribute name. It is saved as datatype char(30).

Examples

Example 1 Removes an application context by specifying some or all attributes:

```
select rm_appcontext("CONTEXT1", "*")
----------
0

select rm_appcontext("*", "*")
---------
0

select rm_appcontext("NON_EXISTING_CTX","ATTR")
---------
-1
```

Example 2 Shows the result when a user without appropriate permissions attempts to remove an application context:

```
select rm_appcontext("CONTEXT1","ATTR2")
----------
-1
```

Usage

- This function always returns 0 for success.
- All the arguments for this function are required.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for rm_appcontext differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must have select permission on rm_appcontext to execute the function.
Granular permissions disabled	With granular permissions disabled, you must be a user with sa_role, or have select permission on rm_appcontext to execute the function.

See also

For more information on the ACF see “Row-level access control” in Chapter 11, “Managing User Permissions” of the *System Administration Guide*.

Functions get_appcontext, list_appcontext, set_appcontext

role_contain

Description
Determines whether a specified role is contained within another specified role.

Syntax
role_contain("*role1*", "*role2*")

Parameters
role1
is the name of a system or user-defined role.

role2
is the name of another system or user-defined role.

Examples
Example 1

```
select role_contain("intern_role", "doctor_role")

-----------
1
```

Example 2

```
select role_contain("specialist_role", "intern_role")
-----------
0
```

Usage
role_contain, a system function, returns 1 if *role1* is contained by *role2*. Otherwise, role_contain returns 0.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute role_contain.

See also
Documents For more information about contained roles and role hierarchies, see the *System Administration Guide*. For system functions, see *Transact-SQL Users Guide*.

Functions mut_excl_roles, proc_role, role_id, role_name

Commands alter role

System procedures sp_activeroles, sp_displayroles, sp_role

role_id

Description
Returns the role ID of the specified role name.

Syntax
role_id("*role_name*")

Parameters
role_name
is the name of a system or user-defined role. Role names and role IDs are stored in the syssrvroles system table.

Examples
Example 1 Returns the system role ID of sa_role:

```
select role_id("sa_role")
------
0
```

Example 2 Returns the system role ID of the “intern_role”:

```
select role_id("intern_role")
------
6
```

Usage

- role_id, a system function, returns the system role ID (srid). System role IDs are stored in the srid column of the syssrvroles system table.
- If the *role_name* is not a valid role in the system, Adaptive Server returns NULL.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute role_id.

See also
Documents For more information about .

- Roles – see the *System Administration Guide*
- System functions – see *Transact-SQL Users Guide*.

Functions mut_excl_roles,proc_role,role_contain, role_name

role_name

Description
Returns the role name of the specified role ID.

Syntax
role_name(*role_id*)

Parameters
role_id
is the system role ID (srid) of the role. Role names are stored in syssrvroles.

Examples

```
select role_name(01)

------------------------------
sso_role
```

Usage
role_name, a system function, returns the role name.

Standards
ANSI SQL – Compliance level: Transact-SQL extension

Permissions
Any user can execute role_name.

See also
Documentation *Transact-SQL Users Guide*

Functions mut_excl_roles, proc_role, role_contain, role_id

round

Description

Returns the value of the specified number, rounded to the specified number of decimal places.

Syntax

round(*number*, *decimal_places*)

Parameters

number

is any exact numeric (numeric, dec, decimal, tinyint, smallint, int, or bigint), approximate numeric (float, real, or double precision), or money column, variable, constant expression, or a combination of these.

decimal_places

is the number of decimal places to round to.

Examples

Example 1

```
select round(123.4545, 2)
----------
  123.4500
```

Example 2

```
select round(123.45, -2)
----------
  100.00
```

Example 3

```
select round(1.2345E2, 2)
-----------------
       123.450000
```

Example 4

```
select round(1.2345E2, -2)
-----------------
      100.000000
```

Usage

- round, a mathematical function, rounds the *number* so that it has *decimal_places* significant digits.
- A positive value for *decimal_places* determines the number of significant digits to the right of the decimal point; a negative value for *decimal_places* determines the number of significant digits to the left of the decimal point.
- Results are of the same type as *number* and, for numeric and decimal expressions, have an internal precision equal to the precision of the first argument plus 1 and a scale equal to that of *number*.

- round always returns a value. If *decimal_places* is negative and exceeds the number of significant digits specified for *number*, Adaptive Server returns 0. (This is expressed in the form 0.00, where the number of zeros to the right of the decimal point is equal to the scale of numeric.) For example, the following returns a value of 0.00:

```
select round(55.55, -3)
```

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute round.

See also — **Documentation** *Transact-SQL Users Guide*

Functions abs, ceiling, floor, sign, str

row_count

Description
Returns an estimate of the number of rows in the specified table.

Syntax
row_count(*dbid*, *object_id* [,*ptnid*] [, “*option*”])

Parameters

dbid
is the the database ID where target object resides.

object_id
is the object ID of table.

ptnid
is the partition ID of interest.

Examples

Example 1 Returns an estimate of the number of rows in the given object:

```
select row_count(5, 31000114)
```

Example 2 Returns an estimate of the number of rows in the specified partition (with partition ID of 2323242432) of the object with object IDof 31000114:

```
select row_count(5, 31000114, 2323242432)
```

Usage

- All erroneous conditions will return in a value of zero being returned.
- Instead of consuming resources, row_count discards the descriptor for an object that is not already in the cache.

Standards
ANSI SQL – Compliance level: Transact-SQL extension

Permissions
Any user can execute row_count.

See also
Functions reserved_pages, used_pages

rtrim

Description

Trims the specified expression of trailing blanks.

Syntax

rtrim(*char_expr* | *uchar_expr*)

Parameters

char_expr
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

```
select rtrim("abcd    ")

--------
abcd
```

Usage

- rtrim, a string function, removes trailing blanks.
- For Unicode, a blank is defined as the Unicode value U+0020.
- If *char_expr* or *uchar_expr* is NULL, returns NULL.
- Only values equivalent to the space character in the current character set are removed.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute rtrim.

See also

Documentation *Transact-SQL Users Guide*

Function ltrim

sdc_intempdbconfig

Description
(Cluster environments only) Returns 1 if the system is currently in temporary database configuration mode; if not, returns 0.

Syntax
sdc_intempdbconfig()

Examples
```
select sdc_intempdbconfig()
```

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can run sdc_intempdbconfig.

set_appcontext

Description

Sets an application context name, attribute name, and attribute value for a user session, defined by the attributes of a specified application. set_appcontext is a provided by the ACF.

Syntax

set_appcontext("*context_name*, "*attribute_name*", "*attribute_value*")

Parameters

context_name
is a row that specifies an application context name. It is saved as the datatype char(30).

attribute_name
is a row that specifies an application context attribute name. It is saved as the datatype char(30).

attribute_value
is a row that specifies and application attribute value. It is saved as the datatype char(30).

Examples

Example 1 Creates an application context called CONTEXT1, with an attribute ATTR1 that has the value VALUE1.

```
select set_appcontext ("CONTEXT1", "ATTR1", "VALUE1")

---------------
0
```

Attempting to override the existing application context created causes:

```
select set_appcontext("CONTEXT1", "ATTR1", "VALUE1")

-------------
-1
```

Example 2 Shows set_appcontext including a datatype conversion in the value.

```
declare@numericvarchar varchar(25)
select @numericvar = "20"
select set_appcontext ("CONTEXT1", "ATTR2",
convert(char(20), @numericvar))

------------
0
```

Example 3 Shows the result when a user without appropriate permissions attempts to set the application context.

```
select set_appcontext("CONTEXT1", "ATTR2", "VALUE1")
--------------
-1
```

Usage

- set_appcontext returns 0 for success and -1 for failure.
- If you set values that already exist in the current session, set_appcontext returns -1.
- This function cannot override the values of an existing application context. To assign new values to a context, remove the context and re-create it using new values.
- set_appcontext saves attributes as char datatypes. If you are creating an access rule that must compare the attribute value to another datatype, the rule should convert the char data to the appropriate datatype.
- All the arguments for this function are required.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for set_appcontext differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must have select permission on set_appcontext to execute the function.
Granular permissions disabled	With granular permissions disabled, you must be a user with sa_role, or have select permission on set_appcontext to execute the function.

See also

Documents For more information on the ACF see “Row-level access control” in Chapter 11, “Managing User Permissions” of the *System Administration Guide*.

Functions get_appcontext, list_appcontext, rm_appcontext

setdata

Description

Overwrites some or all of a large object (LOB).

Syntax

setdata(*locator_name*, *offset_value*, *new_value*)

Parameters

locator_name
is a locator that references the LOB value you are modifying.

offset_value
is a position within the LOB to which *locator_name* points. This is the position where the Adaptive Server begins writing the contents of *new_value*. The value for *offset_value* is in characters for text_locator and unitext_locator, and in bytes for image_locator. The first character or byte of the LOB has an *offset_value* of 1.

new_value
is the data with which you are overwriting the old data.

Examples

The final select statement in this example returns the string "Sybase ABC/IQ/ASA" instead of the original string, "Sybase "ASE/IQ/ASA":

```
declare @v text_locator
  select @v = create_locator
    (text_locator, convert(text, "Sybase ASE/IQ/ASA")
  select setdata(@v, 8, "ABC")
  select return_lob(text, @v)
```

Usage

- setdata modifies the LOB value in-place. That is, Adaptive Server does not copy the LOB before it is modified.
- If the length of *new_value* is longer than the remaining length of the LOB after skipping the *offset_value*, Adaptive Server extends the LOB to hold the entire length of *new_value*.
- If the sum of *new_value* and *offset_value* is shorter than the length of the LOB, Adaptive Server does not change or truncate the data at the end of the LOB.
- setdata returns NULL if the *offset_value* is longer than the LOB value you are updating.

Permissions

Any user can execute setdata.

See also

Commands deallocate locator, truncate lob

Transact-SQL functions locator_valid, return_lob, create_locator

show_cached_plan_in_xml

Description

Displays, in XML, the executing query plan for queries in the statement cache.

show_cached_plan_in_xml returns sections of the showplan utility output in XML format.

Syntax

show_cached_plan_in_xml(*statement_id*, *plan_id*, [*level_of_detail*])

Parameters

statement_id

is the object ID of the lightweight procedure. A lightweight procedure is one that can be created and invoked internally by Adaptive Server. This is the SSQLID column from monCachedStatement, which contains a unique identifier for each cached statement.

plan_id

is the unique identifier for the plan. This is the PlanID from monCachedProcedures. A value of zero for *plan_id* displays the showplan output for all cached plans for the indicated SSQLID.

level_of_detail

is a value from 0 – 6 indicating the amount of detail show_cached_plan_in_xml returns (see Table 2-6). *level_of_detail* determines which sections of showplan are returned by show_cached_plan_in_xml. The default value is 0.

The output of show_cached_plan_in_xml includes the *plan_id* and these sections:

- `parameter` – contains the parameter values used to compile the query and the parameter values that caused the slowest performance. The compile parameters are indicated with the `<compileParameters>` and `</compileParameters>` tags. The slowest parameter values are indicated with the `<execParameters>` and `</execParameters>` tags. For each parameter, show_cached_plan_in_xml displays the:
  - Number
  - Datatype
  - Value – values that are larger than 500 bytes and values for insert-value statements do not appear. The total memory used to store the values for all parameters is 2KB for each of the two parameter sets.

Examples

Example 1 A query plan rendered in XML:

```
select show_cache_plan_in_xml(1328134997,0)
go
-------------------------------------------
```

```
<?xml version="1.0" encoding="UTF-8"?>
<query>
    <statementId>1328134997</statementId>
<text>
    <![CDATA[SQL Text: select name from sysobjects where id = 10]]>
</text>
<plan>
    <planId>11</planId>
    <planStatus> available </planStatus>
    <execCount>1371</execCount>
    <maxTime>3</maxTime>
    <avgTime>0</avgTime>
    <compileParameters/>
    <execParameters/>
    <opTree>
        <Emit>
        <VA>1</VA>
        <est>
            <rowCnt>10</rowCnt>
            <lio>0</lio>
            <pio>0</pio>
            <rowSz>22.54878</rowSz>
        </est>
        <act>
            <rowCnt>1</rowCnt>
        </act>
        <arity>1</arity>
            <IndexScan>
                <VA>0</VA>
                <est>
                    <rowCnt>10</rowCnt>
                    <lio>0</lio>
                    <pio>0</pio>
                    <rowSz>22.54878</rowSz>
                </est>
                <act>
                    <rowCnt>1</rowCnt>
                    <lio>3</lio>
                    <pio>0</pio>
                </act>
                <varNo>0</varNo>
                <objName>sysobjects</objName>
                <scanType>IndexScan</scanType>
                <indName>csysobjects</indName>
                <indId>3</indId>
                <scanOrder> ForwardScan </scanOrder>
```

```
                    <positioning> ByKey </positioning>
                    <perKey>
                        <keyCol>id</keyCol>
                        <keyOrder> Ascending </keyOrder>
                    </perKey>
                    <indexIOSizeInKB>2</indexIOSizeInKB>
                    <indexBufReplStrategy> LRU </indexBufReplStrategy>
                    <dataIOSizeInKB>2</dataIOSizeInKB>
                    <dataBufReplStrategy> LRU </dataBufReplStrategy>
                 </IndexScan>
            </Emit>
        </opTree>
</plan>
```

Example 2 This example shows enhanced <est>, <act>, and <scanCoverage> tags available in 15.7.1 and later versions of Adaptive Server:

```
select show_cached_plan_in_xml(1123220018, 0)
go

<?xml version="1.0" encoding="UTF-8"?>
<query>
   <statementId>1123220018</statementId>
   <text>
   <![CDATA[
   SQL Text: select distinct c1, c2 from t1, t2 where c1 = d1 PLAN '(
distinct_hashing ( nl_join ( t_scan t2 ) ( i_scan i1t1 t1 ) ) )']]>
   </text>
   <plan>
      <planId>6</planId>
      <planStatus> available </planStatus>
      <execCount>1</execCount>
      <maxTime>16</maxTime>
      <avgTime>16</avgTime>
      <compileParameters/>
      <execParameters/>
      <opTree>
         <Emit>
            <VA>4</VA>
            <est>
               <rowCnt>1</rowCnt>
               <lio>0</lio>
               <pio>0</pio>
               <rowSz>10</rowSz>
            </est>
            <arity>1</arity>
            <HashDistinct>
```

```
<VA>3</VA>
<est>
   <rowCnt>1</rowCnt>
   <lio>5</lio>
   <pio>0</pio>
   <rowSz>10</rowSz>
</est>
<arity>1</arity>
<WorkTable>
   <wtObjName>WorkTable1</wtObjName>
</WorkTable>
<NestLoopJoin>
   <VA>2</VA>
   <est>
      <rowCnt>1</rowCnt>
      <lio>0</lio>
      <pio>0</pio>
      <rowSz>10</rowSz>
   </est>
   <arity>2</arity>
   <TableScan>
      <VA>0</VA>
      <est>
         <rowCnt>1</rowCnt>
         <lio>1</lio>
         <pio>0.9999995</pio>
         <rowSz>6</rowSz>
      </est>
      <varNo>0</varNo>
      <objName>t2</objName>
      <scanType>TableScan</scanType>
      <scanOrder> ForwardScan </scanOrder>
      <positioning> StartOfTable </positioning>
      <scanCoverage> NonCovered </scanCoverage>
      <dataIOSizeInKB>16</dataIOSizeInKB>
      <dataBufReplStrategy> LRU </dataBufReplStrategy>
   </TableScan>
   <IndexScan>
      <VA>1</VA>
      <est>
         <rowCnt>1</rowCnt>
         <lio>0</lio>
         <pio>0</pio>
         <rowSz>10</rowSz>
      </est>
      <varNo>1</varNo>
```

```
                    <objName>t1</objName>
                    <scanType>IndexScan</scanType>
                    <indName>i1t1</indName>
                    <indId>1</indId>
                    <scanOrder> ForwardScan </scanOrder>
                    <positioning> ByKey </positioning>
                    <scanCoverage> NonCovered </scanCoverage>
                    <perKey>
                       <keyCol>c1</keyCol>
                       <keyOrder> Ascending </keyOrder>
                    </perKey>
                    <dataIOSizeInKB>16</dataIOSizeInKB>
                    <dataBufReplStrategy> LRU </dataBufReplStrategy>
                 </IndexScan>
              </NestLoopJoin>
           </HashDistinct>
        </Emit>
        <est>
           <totalLio>6</totalLio>
           <totalPio>0.9999995</totalPio>
        </est>
        <act>
           <totalLio>0</totalLio>
           <totalPio>0</totalPio>
        </act>
     </opTree>
  </plan>
</query>
```

Usage

- Enable the statement cache before you use show_cached_plan_in_xml.
- Use show_cached_plan_in_xml for cached statements only.
- The plan does not print if it is in use. Plans with the status of `available` print plan details. Plans with the status of `in use` show only the process ID.
- The table below shows the show_cached_plan_in_xml sections that appear for the *level_of_detail* values:

Table 2-6: Level of detail

level_of_detail	parameter	opTree	execTree
0 (the default)	X	X	
1	X		
2		X	
3			X
4		X	X

level_of_detail	parameter	opTree	execTree
5	X		X
6	X	X	X

Permissions

The permission checks for show_cached_plan_in_xml differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must be a user with mon_role, or have monitor qp performance permission to execute show_cached_plan_in_xml.
Granular permissions disabled	With granular permissions disabled, you must be a user with mon_role or sa_role to execute show_cached_plan_in_xml.

show_cached_text

Description

Displays the SQL text of a cached statement.

Syntax

show_cached_text(*statement_id*)

Parameters

statement_id
is the ID of the statement. Derived from the SSQLID column of monCachedStatement.

Examples

Displays the contents of monCachedStatement, then uses the show_cached_text function to show the SQL text:

```
select InstanceID, SSQLID, Hashkey, UseCount, StmtType
from monCachedStatement
InstanceID  SSQLID     Hashkey    UseCount   StmtType
----------  ---------- ---------- ----------- --------
0           329111220  1108036110           0        2
0           345111277  1663781964           1        1

select show_cached_text(329111220)
--------------------------------------
select id from sysroles
```

Usage

- show_cached_text displays up to 16K of SQL text, and truncates text longer than 16K. Use show_cached_text_long for text longer than 16K.
- show_cached_text returns a varchar datatype.

show_cached_text_long

Description — Displays the SQL text for cached statements longer than 16K.

Syntax — show_cached_text_long(*statement_id*)

Parameters — *statement_id*

is the ID of the statement. Derived from the SSQLID column of monCachedStatement.

Examples — This selects the SQL text from the monCachedStatement monitoring table (the result set has been shortened for easier readability):

```
select show_cached_text_long(SSQLID) as sql_text, StatementSize from
monCachedStatement
sql_text
StatementSize
---------------------------------------------------------------------------
---------------------------------------------
SELECT first_column ......
188888
```

Usage

- show_cached_text_long displays up to 2M of SQL text.
- show_cached_text_long returns a text datatype.
- Using show_cached_text_long requires you to configure set textsize *value* at a large value. If you configure a value that is too small, Adaptive Server clients (for example, isql) truncate the show_cached_text_long result set.

show_dynamic_params_in_xml

Description

Returns parameter information for a dynamic SQL query (a prepared statement) in XML format.

Syntax

show_dynamic_params_in_xml(*object_id*)

Parameters

object_id
ID of the dynamic, SQL lightweight stored procedure you are investigating. Usually the return value of the *@@plwpid* global variable.

Examples

For this example, first find the object ID:

```
select @@plwpid
----------------
707749902
```

Then use the ID as the input parameter for show_dynamic_params_in_xml:

```
select show_dynamic_params_in_xml(707749902)

<?xml version="1.0" encoding="UTF-8"?>
<query>
    <parameter>
        <number>1</number>
        <type>INT</type>
        <column>tab.col1</column>
    </parameter>
</query>
```

Parameter	Value	Definition
number	1	Dynamic parameter is in the statement's first position
type	INT	Table uses the int datatype
column	tab.col1	Query use the col1 column of the tab table

Usage

- show_dynamic_params_in_xml allows dynamic parameters in where clauses, the set clause of an update, and the *values* list of an insert.
- For where clauses, show_dynamic_params_in_xml determines associations according to the smallest subtree involving an expression with a column, a relational operator, and an expression with a parameter. For example:

  ```
  select * from tab where col1 + 1 = ?
  ```

  If the query has no subtree, show_dynamic_params_in_xml omits the <column> element. For example:

  ```
  select * from tab where ? < 1000
  ```

- show_dynamic_params_in_xml selects the first column it encounters for expressions involving multiple columns:

  ```
  delete tab where col1 + col2 > ?
  ```

- The association is unambigous for update . . . set statements. For example:

  ```
  update tab set col1 = ?
  ```

show_plan

Description

Retrieves the query plan for a specified server process (the target process) and a SQL statement. This function is called several times by sp_showplan because a built-in function can return just one value per call, but sp_showplan must return several values to the client.

Syntax

show_plan(*spid*, *batch_id*, *context_id*, *statement_number*)

Parameters

spid
is the process ID for any user connection.

batch_id
is the unique number for a batch.

context_id
is the unique number of every procedure (or trigger).

statement_number
is the number of the current statemenmt within a batch.

Examples

In the following example, show_plan performs the following:

- Validates parameter values that sp_showplan cannot validate. -1 is passed in when the user executes sp_showplan without a value for a parameter. Only the *spid* value is required.
- If just a process ID is received, then show_plan returns the batch ID, the context ID, and the statement number in three successive calls by sp_showplan.
- Find the E_STMT pointer for the specified SQL statement number.
- Retrieves the target process's query plan for the statement. For parallel worker processes the equivalent parent plan is retrieved to reduce performance impact.
- Synchronizes access to the query plan with the target process.

```
if (@batch_id is NULL)
  begin
    /* Pass -1 for unknown values. */
    select @return_value = show_plan(@spid, -1, -1, -1)
    if (@return_value < 0)
         return (1)
    else
    select @batch_id = @return_value

    select @return_value = show_plan(@spid, @batch_id, -1, -1)
    if (@return_value < 0)
```

```
            return (1)
        else
          select @context_id = @return_value

        select @return_value = show_plan(@spid, @batch_id, @context_id, -1)
        if (@return_value < 0)
            return (1)
        else
        begin
           select @stmt_num = @return_value
          return (0)
        end
      end
```

As the example shows, call show_plan three times for a *spid* :

- The first returns the batch ID
- The second returns the context ID
- The third displays the query plan, and returns the current statement number.

Usage

For a statement that is not performing well, you can change the plans by altering the optimizer settings or specifying an abstract plan.

When you specify the first int variable in the existing show_plan argument as "-", show_plan treats the second parameter as a SSQLID.

Note A single entry in the statement cache may be associated with multiple, and possibly different, SQL plans. show_plan displays only one of them.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

See also

Procedures sp_showplan

show_role

Description
Displays the currently active system-defined roles of the current login.

Syntax
show_role()

Parameters
None.

Examples

Example 1

```
select show_role()
```

```
sa_role sso_role oper_role replication_role
```

Example 2

```
if charindex("sa_role", show_role()) >0
begin
    print "You have sa_role"
end
```

Usage

- show_role, a system function, returns the login's current active system-defined roles, if any (sa_role, sso_role, oper_role, or replication_role). If the login has no roles, show_role returns NULL.
- When a Database Owner invokes show_role after using setuser, show_role displays the active roles of the Database Owner, not the user impersonated with setuser.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute show_role.

See also
Commands alter role, create role, drop role, grant, set, revoke

Documentation *Transact-SQL Users Guide*

Functions proc_role, role_contain

System procedures sp_activeroles, sp_displayroles, sp_role

show_sec_services

Description: Lists the security services that are active for the session.

Syntax: show_sec_services()

Parameters: None.

Examples: Shows that the user's current session is encrypting data and performing replay detection checks:

```
select show_sec_services()
```

```
encryption, replay_detection
```

Usage:

- Use show_sec_services to list the security services that are active during the session.
- If no security services are active, show_sec_services returns NULL.

Standards: ANSI SQL – Compliance level: Transact-SQL extension.

Permissions: Any user can execute show_sec_services.

See also: **Functions** is_sec_service_on

sign

Description

Returns the sign (1 for positive, 0, or -1 for negative) of the specified value.

Syntax

sign(*numeric*)

Parameters

numeric

is any exact numeric (numeric, dec, decimal, tinyint, smallint, int, or bigint), approximate numeric (float, real, or double precision), or money column, variable, constant expression, or a combination of these.

Examples

Example 1

```
select sign(-123)
-----------
         -1
```

Example 2

```
select sign(0)
-----------
          0
```

Example 3

```
select sign(123)
-----------
          1
```

Usage

- sign, a mathematical function, returns the positive (1), zero (0), or negative (-1).
- Results are of the same type, and have the same precision and scale, as the numeric expression.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute sign.

See also

Documentation *Transact-SQL Users Guide*

Functions abs, ceiling, floor, round

sin

Description
Returns the sine of the angle specified in radians.

Syntax
sin(*approx_numeric*)

Parameters
approx_numeric
is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

Examples

```
select sin(45)
--------------------
            0.850904
```

Usage
sin, a mathematical function, returns the sine of the specified angle (measured in radians).

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute sin.

See also
Documentation *Transact-SQL Users Guide*

Functions cos, degrees, radians

sortkey

Description

Generates values that can be used to order results based on collation behavior, which allows you to work with character collation behaviors beyond the default set of Latin character-based dictionary sort orders and case- or accent-sensitivity.

Syntax

sortkey(*char_expression* | *uchar_expression*)[, {*collation_name* | *collation_ID*}])

Parameters

char_expression
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expression
is a character-type column name, variable, or constant expression of unichar or univarchar type.

collation_name
is a quoted string or a character variable that specifies the collation to use. Table 2-8 on page 272 shows the valid values.

collation_ID
is an integer constant or a variable that specifies the collation to use. Table 2-8 on page 272 shows the valid values.

Examples

Example 1 Shows sorting by European language dicitionary order:

```
select * from cust_table where cust_name like "TI%" order by
    (sortkey(cust_name, "dict")
```

Example 2 Shows sorting by simplified Chinese phonetic order:

```
select *from cust_table where cust name like "TI%" order by
    (sortkey(cust-name, "gbpinyin")
```

Example 3 Shows sorting by European language dictionary order using the in-line option:

```
select *from cust_table where cust_name like "TI%" order by cust_french_sort
```

Example 4 Shows sorting by Simplified Chinese phonetic order using preexisting keys:

```
select * from cust_table where cust_name like "TI%" order by
    cust_chinese_sort.
```

Usage

- sortkey, a system function, generates values that can be used to order results based on collation behavior. This allows you to work with character collation behaviors beyond the default set of Latin-character-based dictionary sort orders and case- or accent-sensitivity. The return value is a varbinary datatype value that contains coded collation information for the input string that is returned from the sortkey function.

  For example, you can store the values returned by sortkey in a column with the source character string. Ro retrieve the character data in the desired order, include in the select statement an order by clause on the columns that contain the results of running sortkey.

  sortkey guarantees that the values it returns for a given set of collation criteria work for the binary comparisons that are performed on varbinary datatypes.

- sortkey can generate up to sixbytes of collation information for each input character. Therefore, the result from using sortkey may exceed the length limit of the varbinary datatype. If this happens, the result is truncated to fit. Since this limit is dependent on the logical page size of your server, truncation removes result bytes for each input character until the result string is less than the following for DOL and APL tables:

Table 2-7: Maximum row and column length—APL and DOL tables

Locking scheme	Page size	Maximum row length	Maximum column length
APL tables	2K (2048 bytes)	1962	1960 bytes
	4K (4096 bytes)	4010	4008 bytes
	8K (8192 bytes)	8106	8104 bytes
	16K (16384 bytes)	16298	16296 bytes
DOL tables	2K (2048 bytes)	1964	1958 bytes
	4K (4096 bytes)	4012	4006 bytes
	8K (8192 bytes)	8108	8102 bytes
	16K (16384 bytes)	16300	16294 bytes If table does not include any variable length columns
	16K (16384 bytes)	16300 (subject to a max start offset of varlen = 8191)	8191-6-2 = 8183 bytes If table includes at least on variable length column.*

* This size includes six bytes for the row overhead and two bytes for the row length field.

If this occurs, Adaptive Server issues a warning message, but the query or transaction that contained the sortkey function continues to run.

- *char_expression* or *uchar_expression* must be composed of characters that are encoded in the server's default character set.
- *char_expression* or *uchar_expression* can be an empty string. If it is an empty string, sortkey returns a zero-length varbinary value, and stores a blank for the empty string.

  An empty string has a different collation value than an NULL string from a database column.
- If *char_expression* or *uchar_expression* is NULL, sortkey returns a null value.
- If a unicode expression has no specified sort order, Adaptive Server uses the binary sort order.
- If you do not specify a value for *collation_name* or *collation_ID*, sortkey assumes binary collation.
- The binary values generated from the sortkey function can change from one major version to another major version of Adaptive Server, such as version 12.0 to 12.5, version 12.9.2 to 12.0, and so on. If you are upgrading to the current version of Adaptive Server, regenerate keys and repopulate the shadow columns before any binary comparison takes place.

Note Upgrades from version 12.5 to 12.5.0.1 do not require this step, and Adaptive Server does not generate any errors or warning messages if you do not regenerate the keys. Although a query involving the shadow columns should work fine, the comparison result may differ from the pre-upgrade server.

Collation tables

There are two types of collation tables you can use to perform multilingual sorting:

1. A "built-in" collation table created by the sortkey function. This function exists in versions of Adaptive Server later than 11.5.1. You can use either the collation name or the collation ID to specify a built-in table.
2. An external collation table that uses the Unilib library sorting functions. You must use the collation name to specify an external table. These files are located in *$SYBASE/collate/unicode*.

Both of these methods work equally well, but a “built-in” table is tied to a Adaptive Server database, while an external table is not. If you use an Adaptive Server database, a built-in table provides the best performance. Both methods can handle any mix of English, European, and Asian languages.

There are two ways to use sortkey:

1. In-line – this uses sortkey as part of the order by clause and is useful for retrofitting an existing application and minimizing the changes. However, this method generates sort keys on-the-fly, and therefore does not provide optimum performance on large data sets of moe than 1000 records.
2. Pre-existing keys – this method calls sortkey whenever a new record requiring multilingual sorting is added to the table, such as a new customer name. Shadow columns (binary or varbinary type) must be set up in the database, preferably in the same table, one for each desired sort order such as French, Chinese, and so on. When a query requires output to be sorted, the order by clause uses one of the shadow columns. This method produces the best performance since keys are already generated and stored, and are quickly compared only on the basis of their binary values.

You can view a list of available collation rules. Print the list by executing either sp_helpsort, or by querying and selecting the name, id, and description from syscharsets (type is between 2003 and 2999).

- Table 2-8 lists the valid values for *collation_name* and *collation_ID*.

Table 2-8: Collation names and IDs

Description	Collation name	Collation ID
Deafult Unicode multilingual	default	20
Thai dictionary order	thaidict	21
ISO14651 standard	iso14651	22
UTF-16 ordering – matches UTF-8 binary ordering	utf8bin	24
CP 850 Alternative – no accent	altnoacc	39
CP 850 Alternative – lowercase first	altdict	45
CP 850 Western European – no case preference	altnocsp	46
CP 850 Scandinavian – dictionary ordering	scandict	47
CP 850 Scandinavian – case-insensitive with preference	scannocp	48
GB Pinyin	gbpinyin	n/a
Binary sort	binary	50
Latin-1 English, French, German dictionary	dict	51
Latin-1 English, French, German no case	nocase	52

Description	Collation name	Collation ID
Latin-1 English, French, German no case, preference	nocasep	53
Latin-1 English, French, German no accent	noaccent	54
Latin-1 Spanish dictionary	espdict	55
Latin-1 Spanish no case	espnocs	56
Latin-1 Spanish no accent	espnoac	57
ISO 8859-5 Russian dictionary	rusdict	58
ISO 8859-5 Russian no case	rusnocs	59
ISO 8859-5 Cyrillic dictionary	cyrdict	63
ISO 8859-5 Cyrillic no case	cyrnocs	64
ISO 8859-7 Greek dictionary	elldict	65
ISO 8859-2 Hungarian dictionary	hundict	69
ISO 8859-2 Hungarian no accents	hunnoac	70
ISO 8859-2 Hungarian no case	hunnocs	71
ISO 8859-9 Turkish dictionary	turdict	72
ISO 8859-9 Turkish no accents	turknoac	73
ISO 8859-9 Turkish no case	turknocs	74
CP932 binary ordering	cp932bin	129
Chinese phonetic ordering	dynix	130
GB2312 binary ordering	gb2312bn	137
Common Cyrillic dictionary	cyrdict	140
Turkish dictionary	turdict	155
EUCKSC binary ordering	euckscbn	161
Chinese phonetic ordering	gbpinyin	163
Russian dictionary ordering	rusdict	165
SJIS binary ordering	sjisbin	179
EUCJIS binary ordering	eucjisbn	192
BIG5 binary ordering	big5bin	194
Shift-JIS binary order	sjisbin	259

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute sortkey.

See also
Function compare

soundex

Description

Returns a four-character soundex code for character strings that are composed of a contiguous sequence of valid single- or double-byte Roman letters.

Syntax

soundex(*char_expr* | *uchar_expr*)

Parameters

char_expr
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

```
select soundex ("smith"), soundex ("smythe")
----- -----
S530  S530
```

Usage

- soundex, a string function, returns a four-character soundex code for character strings that are composed of a contiguous sequence of valid single- or double-byte roman letters.
- The soundex function converts an alphabetic string to a four-digit code for use in locating similar-sounding words or names. All vowels are ignored unless they constitute the first letter of the string.
- If *char_expr* or *uchar_expr* is NULL, returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute soundex.

See also

Documentation *Transact-SQL Users Guide*

Function difference

space

Description
Returns a string consisting of the specified number of single-byte spaces.

Syntax
space(*integer_expr*)

Parameters
integer_expr
is any integer (tinyint, smallint, or int) column name, variable, or constant expression.

Examples
```
select "aaa", space(4), "bbb"

--- ---- ---
aaa      bbb
```

Usage
space, a string function, returns a string with the indicated number of single-byte spaces.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute space.

See also
Documentation *Transact-SQL Users Guide*

Functions isnull, rtrim

spid_instance_id

Description — (Cluster environments only) Returns the instance ID on which the specified process id (spid) is running.

Syntax — spid_instance_id(*spid_value*)

Parameters

spid_value
: the spid number whose instance id is requested

Examples — Returns the ID of the instance that is running process id number 27:

```
select spid_instance_id(27)
```

Usage

- If you do not include a spid value, spid_instance_id returns NULL.
- If you enter an invalid or non-existing process id value, spid_instance_id returns NULL.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute spid_instance_id.

square

Description
Calculates the square of a specified value expressed as a float.

Syntax
square(*numeric_expression*)

Parameters
numeric_expression
is a numeric expression of type float.

Examples
Example 1 Returns the square from an integer column:

```
select square(total_sales)from titles
------------
16769025.00000
15023376.00000
350513284.00000
...
16769025.00000
(18 row(s) affected)
```

Example 2 Returns the square from a money column:

```
select square(price) from titles
-----------
399.600100
142.802500
8.940100
NULL
...
224.700100
(18 row(s) affected)
```

Usage
This function is the equivalent of power(*numeric_expression*,2), but it returns type float rather than int.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute square.

See also
Function power

Datatypes exact_numeric, approximate_numeric, money, float

sqrt

Description
Calculates the square root of the specified number.

Syntax
sqrt(*approx_numeric*)

Parameters
approx_numeric
is any approximate numeric (float, real, or double precision) column name, variable, or constant expression that evaluates to a positive number.

Examples

```
select sqrt(4)

 2.000000
```

Usage

- sqrt, a mathematical function, returns the square root of the specified value.
- If you attempt to select the square root of a negative number, Adaptive Server returns the following error message:

```
Domain error occurred.
```

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute sqrt.

See also
Documentation *Transact-SQL Users Guide*

Function power

stddev

Description

Computes the standard deviation of a sample consisting of a numeric expression, as a double.

Note stddev and stdev are aliases for stddev_samp. See stddev_samp on page 283 for details.

---

stdev

Description

Computes the standard deviation of a sample consisting of a numeric expression, as a double.

Note stddev and stdev are aliases for stddev_samp. See stddev_samp on page 283 for details.

---

stdevp

Description

Computes the standard deviation of a population consisting of a numeric expression, as a double.

Note stdevp is an alias for stddev_pop. See stddev_pop on page 282 for details.

stddev_pop

Description

Computes the standard deviation of a population consisting of a numeric expression, as a double. stdevp is an alias for stddev_pop, and uses the same syntax.

Syntax

stddev_pop ([all | distinct] *expression*)

Parameters

all
: applies stddev_pop to all values. all is the default.

distinct
: eliminates duplicate values before stddev_pop is applied.

expression
: is the expression—commonly a column name—in which its population-based standard deviation is calculated over a set of rows.

Examples

The following statement lists the average and standard deviation of the advances for each type of book in the pubs2 database.

```
select type, avg(advance) as "avg", stddev_pop(advance)
  as "stddev" from titles group by type order by type
```

Usage

Computes the population standard deviation of the provided value expression evaluated for each row of the group (if distinct was specified, then each row that remains after duplicates have been eliminated), defined as the square root of the population variance.

Figure 2-1: The formula for population-related statistical aggregate functions

The formula that defines the variance of the population of size *n* having mean μ (var_pop) is as follows. The population standard deviation (stddev_pop) is the positive square root of this.

$$\sigma^2 = \frac{\sum (x_i - \mu)^2}{n}$$

σ^2 = Variance

n = Population size

μ = Mean of the values x_i

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute stddev_pop.

See also

Documentation *Transact-SQL Users Guide*

Functions stddev_samp, var_pop, var_samp

stddev_samp

Description

Computes the standard deviation of a sample consisting of a numeric expression as a double. stdev and stddev are aliases for stddev_samp, and use the same syntax.

Syntax

stddev_samp ([all | distinct] *expression*)

Parameters

all
: applies stddev_samp to all values. all is the default.

distinct
: eliminates duplicate values before stddev_samp is applied.

expression
: is any numeric datatype (float, real, or double precision) expression.

Examples

The following statement lists the average and standard deviation of the advances for each type of book in the pubs2 database.

```
select type, avg(advance) as "avg",
  stddev_samp(advance) as "stddev" from titles
  where total_sales > 2000 group by type order by type
```

Usage

Computes the sample standard deviation of the provided value expression evaluated for each row of the group (if distinct was specified, then each row that remains after duplicates have been eliminated), defined as the square root of the sample variance.

Figure 2-2: The formula for sample-related statistical aggregate functions

The formula that defines an unbiased estimate of the population variance from a sample of size n having mean $\bar{x}$ (var_samp) is as follows. The sample standard deviation (stddev_samp) is the positive square root of this.

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

s^2 = Variance

n = Sample size

$\bar{x}$ = Mean of the values x_i

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute stddev_samp.

See also

Documentation *Transact-SQL Users Guide*

Functions stddev_pop, var_pop, var_samp

str

Description

Returns the character equivalent of the specified number, and pads the output with a character or numeric to the specified length.

Syntax

str(*approx_numeric*[, *length* [, *decimal*]])

Parameters

approx_numeric

is any approximate numeric (float, real, or double precision) column name, variable, or constant expression.

length

sets the number of characters to be returned (including the decimal point, all digits to the right and left of the decimal point, and blanks). The default is 10.

decimal

sets the number of decimal digits to be returned. The default is 0. Also can be used to pad the output with a character or numeric to the specified length.

When you specify a character or numeric as a literal string, the character or numeric is used as padding for the field. When you specify a numeric value, sets the number of decimal places. The default is 0. When *decimal* is not set, the field is padded with blanks to the value specified by *length*.

Examples

Example 1 When *decimal* is set as the string literal '0', the field is padded with 0 to a length of 10 spaces.

```
select str(5,10,'0')
----------------
  0000000005
```

Example 2 When *decimal* is a numeric of 5, the number of decimal places is set to 5.

```
select str(5,10,5)
----------------
   5.00000
```

Example 3 When *decimal* is set to the character of '_', the original value is maintained and the field is padded with the specified character to a length of 16 spaces.

```
select str(12.34500,16,'_')
----------------
________12.34500
```

Example 4 Without *decimal* set, the floating number is set to zero decimal places and the field is padded with blanks to a length of 16 spaces.

```
select str(12.34500e,16)
----------------
              12
```

Example 5 With *decimal* set to a numeric, the floating number is processed to 7 decimal places and the field is padded with blanks to a length of 16 spaces.

```
select str(12.34500e,16,7)
----------------
      12.3450000
```

Example 6 Specify a prefix character and process a floating number to a specified number of decimal places using these examples:

```
select str(convert(numeric(10,2),12.34500e),16,'-')
----------------
-----------12.35

select str(convert(numeric(10,8),12.34500e),16,'-')
----------------
-----12.34500000
```

Usage

- *length* and *decimal* are optional, but if used, must be positive integers. str rounds the decimal portion of the number so that the results fit within the specified length. The length should be long enough to accommodate the decimal point and, if the number is negative, the number's sign. The decimal portion of the result is rounded to fit within the specified length. If the integer portion of the number does not fit within the length, however, str returns a row of asterisks of the specified length. For example:

  ```
  select str(123.456, 2, 4)
  --
  **
  ```

- If *approx_numeric* is NULL, returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute str.

See also

Documentation *Transact-SQL Users Guide*

Functions abs, ceiling, floor, round, sign

str_replace

Description

Replaces any instances of the second string expression (*string_expression2*) that occur within the first string expression (*string_expression1*) with a third expression (*string_expression3*).

Syntax

str_replace("*string_expression1*", "*string_expression2*", "*string_expression3*")

Parameters

string_expression1
is the source string, or the string expression to be searched, expressed as char, varchar, unichar, univarchar, varbinary, or binary datatype.

string_expression2
is the pattern string, or the string expression to find within the first expression (*string_expression1*). *string_expression2* is expressed as char, varchar, unichar, univarchar, varbinary, or binary datatype.

string_expression3
is the replacement string expression, expressed as char, varchar, unichar, univarchar, binary, or varbinary datatype.

Examples

Example 1 Replaces the string *def* within the string *cdefghi* with *yyy*.

```
str_replace("cdefghi","def","yyy")
-------------
cyyyghi
(1 row(s) affected)
```

Example 2 Replaces all spaces with "toyota".

```
select str_replace("chevy, ford, mercedes",
"","toyota")
----------
chevy,toyotaford,toyotamercedes
(1 row(s) affected)
```

Note Adaptive Server converts an empty string constant to a string of one space automatically, to distinguish the string from NULL values.

Example 3 Returns “abcghijklm”:

```
select str_replace("abcdefghijklm", "def", NULL)

----------
abcghijklm
(1 row affected)
```

Usage

- Returns varchar data if *string_expression* (1, 2, or 3) is char or varchar.

- Returns univarchar data if *string_expression* (1, 2, or 3) is unichar or univarchar.
- Returns varbinary data if *string_expression* (1, 2, or 3) is binary or varbinary.
- All arguments must share the same datatype.
- If any of the three arguments is NULL, the function returns null.

  str_replace accepts NULL in the third parameter and treats it as an attempt to replace *string_expression2* with NULL, effectively turning str_replace into a "string cut" operation.

  For example, the following returns "abcghijklm":

  ```
  str_replace("abcdefghijklm", "def", NULL)
  ```

- The result length may vary, depending upon what is known about the argument values when the expression is compiled. If all arguments are variables with known constant values, Adaptive Server calculates the result length as:

  ```
  result_length = ((s/p)*(r-p)+s)
  where
  s = length of source string
  p = length of pattern string
  r = length of replacement string
  if (r-p) <= 0, result length = s
  ```

- If the source string (*string_expression1*) is a column, and *string_expression2* and *string_expression3* are constant values known at compile time, Adaptive Server calculates the result length using the formula above.
- If Adaptive Server cannot calculate the result length because the argument values are unknown when the expression is compiled, the result length used is 255, unless traceflag 244 is on. In that case, the result length is 16384.
- result_len never exceeds 16384.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute str_replace.

See also

Datatypes char, varchar, binary, varbinary, unichar, univarchar

Function length

strtobin

Description

Converts a sequence of alphanumeric characters to their equivalent hexadecimal digits.

Syntax

select strtobin("*string of valid alphanumeric characters*")

Parameters

string of valid alphanumeric characters
is string of valid alphanumeric characters, which consists of [1 – 9], [a – f] and [A – F].

Examples

Example 1 Converts the alphanumeric string of "723ad82fe" to a sequence of hexadecimal digits:

```
select strtobin("723ad82fe")
go

-----------------------------------
0x0723ad82fe
```

The in-memory representation of the alphanumeric character string and its equivalent hexadecimal digits are:

Alphanumeric character string (9 bytes)

0	7	2	3	a	d	8	2	f	e

Hexadecimal digits (5 bytes)

0	7	2	3	a	d	8	2	f	e

The function processes characters from right to left. In this example, the number of characters in the input is odd. For this reason, the hexadecimal sequence has a prefix of "0" and is reflected in the output.

Example 2 Converts the alphanumeric string of a local variable called *@str_data* to a sequence of hexadecimal digits equivalent to the value of "723ad82fe":

```
declare @str_data varchar(30)
select @str_data = "723ad82fe"
select strtobin(@str_data)
go

----------
0x0723ad82fe
```

Usage

- Any invalid characters in the input results in NULL as the output.
- The input sequence of hexadecimal digits must have a prefix of "0x".
- A NULL input results in NULL output.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute strtobin.

See also **Function** bintostr

stuff

Description

Returns the string formed by deleting a specified number of characters from one string and replacing them with another string.

Syntax

stuff(*char_expr1* | *uchar_expr1*, *start*, *length*, *char_expr2* | *uchar_expr2*)

Parameters

char_expr1
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr1
is a character-type column name, variable, or constant expression of unichar or univarchar type.

start
specifies the character position at which to begin deleting characters.

length
specifies the number of characters to delete.

char_expr2
is another character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

uchar_expr2
is another character-type column name, variable, or constant expression of unichar or univarchar type.

Examples

Example 1

```
select stuff("abc", 2, 3, "xyz")

----
axyz
```

Example 2

```
select stuff("abcdef", 2, 3, null)

go
---
aef
```

Example 3

```
select stuff("abcdef", 2, 3, "")

----
a ef
```

Usage

- stuff, a string function, deletes *length* characters from *char_expr1* or *uchar_expr1* at *start*, then inserts *char_expr2* or *uchar_expr2* into *char_expr1* or *uchar_expr2* at *start*. For general information about string functions, see *Transact-SQL Users Guide*.
- If the start position or the length is negative, a NULL string is returned. If the start position is zero or longer than *expr1*, a NULL string is returned. If the length to be deleted is longer than *expr1*, *expr1* is deleted through its last character (see Example 1).
- If the start position falls in the middle of a surrogate pair, start is adjusted to be one less. If the start length position falls in the middle of a surrogate pair, length is adjusted to be one less.
- To use stuff to delete a character, replace *expr2* with NULL rather than with empty quotation marks. Using ‘‘ ’’ to specify a null character replaces it with a space (see Eexamples 2 and 3).
- If *char_expr1* or *uchar_expr1* is NULL, stuff returns NULL. If *char_expr1* or *or uchar_expr1* is a string value and *char_expr2* or *uchar_expr2* is NULL, stuff replaces the deleted characters with nothing.
- If you give a varchar expression as one parameter and a unichar expression as the other, the varchar expression is implicitly converted to unichar (with possible truncation).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute stuff.

See also

Functions replicate, substring

substring

Description

Returns the string formed by extracting the specified number of characters from another string.

Syntax

substring(*expression*, *start, length*)

Parameters

expression
is a binary or character column name, variable, or constant expression. Can be char, nchar, unichar, varchar, univarchar, or nvarchar data, binary, or varbinary.

start
specifies the character position at which the substring begins.

length
specifies the number of characters in the substring.

Examples

Example 1 Displays the last name and first initial of each author, for example, "Bennet A.":

```
select au_lname, substring(au_fname, 1, 1)
from authors
```

Example 2 Converts the author's last name to uppercase, then displays the first three characters:

```
select substring(upper(au_lname), 1, 3)
from authors
```

Example 3 Concatenates pub_id and title_id, then displays the first six characters of the resulting string:

```
select substring((pub_id + title_id), 1, 6)
from titles
```

Example 4 Extracts the lower four digits from a binary field, where each position represents two binary digits:

```
select substring(xactid,5,2)
from syslogs
```

Usage

- substring, a string function, returns part of a character or binary string. For general information about string functions, see *Transact-SQL Users Guide*.
- If substring's second argument is NULL, the result is NULL. If substring's first or third argument is NULL, the result is blank..

- If the start position from the beginning of *uchar_expr1* falls in the middle of a surrogate pair, *start* is adjusted to one less. If the start length position from the beginning of *uchar_expr1* falls in the middle of a surrogate pair, *length* is adjusted to one less.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute substring.

See also

Functions charindex, patindex, stuff

sum

Description
Returns the total of the values.

Syntax
sum([all | distinct] *expression*)

Parameters

all
applies sum to all values. all is the default.

distinct
eliminates duplicate values before sum is applied. distinct is optional.

expression
is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name. For more information, see "Expressions" on page 349.

Examples

Example 1 Calculates the average advance and the sum of total sales for all business books. Each of these aggregate functions produces a single summary value for all of the retrieved rows:

```
select avg(advance), sum(total_sales)
from titles
where type = "business"
```

Example 2 Used with a group by clause, the aggregate functions produce single values for each group, rather than for the entire table. This statement produces summary values for each type of book:

```
select type, avg(advance), sum(total_sales)
from titles
group by type
```

Example 3 Groups the titles table by publishers, and includes only those groups of publishers who have paid more than $25,000 in total advances and whose books average more than $15 in price:

```
select pub_id, sum(advance), avg(price)
from titles
group by pub_id
having sum(advance) > $25000 and avg(price) > $15
```

Usage

- sum, an aggregate function, finds the sum of all the values in a column. sum can only be used on numeric (integer, floating point, or money) datatypes. Null values are ignored in calculating sums.

- When you sum integer data, Adaptive Server treats the result as an int value, even if the datatype of the column is smallint or tinyint.When you sum bigint data, Adaptive Server treats the result as a bigint.To avoid overflow errors in DB-Library programs, declare all variables for results of averages or sums appropriately.
- You cannot use sum with the binary datatypes.
- This function defines only numeric types; use with Unicode expressions generates an error.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute sum.

See also

Commands compute clause, group by and having clauses, select, where clause

Documentation *Transact-SQL Users Guide*

Functions count, max, min

suser_id

Description — Returns the server user's ID number from the syslogins table.

Syntax — suser_id([*server_user_name*])

Parameters — *server_user_name*
is an Adaptive Server login name.

Examples — **Example 1**

```
select suser_id()

------
     1
```

Example 2

```
select suser_id("margaret")

------
     5
```

Usage

- suser_id, a system function, returns the server user's ID number from syslogins. For general information about system functions, see *Transact-SQL Users Guide*.
- To find the user's ID in a specific database from the sysusers table, use the user_id system function.
- If no *server_user_name* is supplied, suser_id returns the server ID of the current user.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute suser_id.

See also — **Documentation** *Transact-SQL Users Guide*

Functions suser_name, user_id

suser_name

Description

Returns the name of the current server user, or the user whose server ID is specified.

Syntax

suser_name([*server_user_id*])

Parameters

server_user_id
is an Adaptive Server user ID.

Examples

Example 1

```
select suser_name()

------------------------------
sa
```

Example 2

```
select suser_name(4)

------------------------------
margaret
```

Usage

suser_name, a system function, returns the server user's name. Server user IDs are stored in syslogins. If no *server_user_id* is supplied, suser_name returns the name of the current user.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute suser_name.

See also

Documentation *Transact-SQL Users Guide*

Functions suser_id, user_name

syb_quit

Description

Terminates the connection.

Syntax

syb_quit()

Examples

Terminates the connection in which the function is executed and returns an error message.

```
select syb_quit()

-------------
CT-LIBRARY error:
    ct_results(): network packet layer:
internal net library error: Net-Library operation
terminated due to disconnect
```

Usage

You can use syb_quit to terminate a script if the isql preprocessor command exit causes an error.

Permissions

Any user can execute syb_quit.

syb_sendmsg

Description

(UNIX only) Sends a message to a User Datagram Protocol (UDP) port.

Syntax

syb_sendmsg *ip_address*, *port_number*, *message*

Parameters

ip_address
is the IP address of the machine where the UDP application is running.

port_number
is the port number of the UDP port.

message
is the message to send. It can be up to 255 characters in length.

Examples

Example 1 Sends the message "Hello" to port 3456 at IP address 120.10.20.5:

```
select syb_sendmsg("120.10.20.5", 3456, "Hello")
```

Example 2 Reads the IP address and port number from a user table, and uses a variable for the message to be sent:

```
declare @msg varchar(255)
    select @msg = "Message to send"
    select syb_sendmsg (ip_address, portnum, @msg)
    from sendports
    where username = user_name()
```

Usage

- To enable the use of UDP messaging, a System Security Officer must set the configuration parameter allow sendmsg to 1.
- No security checks are performed with syb_sendmsg. Sybase strongly recommends that you do not use syb_sendmsg to send sensitive information across the network. By enabling this functionality, the user accepts any security problems that result from its use.
- For a sample C program that creates a UDP port, see sp_sendmsg.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute syb_sendmsg.

See also

System procedure sp_sendmsg

sys_tempdbid

Description

(Cluster environments only) Returns the id of the effective local system temporary database of the specified instance. Returns the id of the effective local system temporary database of the current instance when *instance_id* is not specified.

Syntax

sys_tempdbid(*instance_id*)

Parameters

instance_id
ID of the instance.

Examples

Returns the effective local system temporary database id for the instance with an instance id of 3:

```
select sys_tempdbid(3)
```

Usage

If you do not specify an instance ID, sys_tempdbid returns the id of the effective local system temporary database for the current instance.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can run sys_tempdbid.

tan

Description
Calculates the tangent of the angle specified in radians.

Syntax
tan(*angle*)

Parameters
angle
is the size of the angle in radians, expressed as a column name, variable, or expression of type float, real, double precision, or any datatype that can be implicitly converted to one of these types.

Examples

```
select tan(60)

--------------------
          0.320040
```

Usage
tan, a mathematical function, returns the tangent of the specified angle (measured in radians).

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute tan.

See also
Documentation *Transact-SQL Users Guide*

Functions atan, atn2, degrees, radians

tempdb_id

Description

Reports the temporary database to which a given session is assigned. The input of the tempdb_id function is a server process ID, and its output is the temporary database to which the process is assigned. If you do not provide a server process, tempdb_id reports the dbid of the temporary database assigned to the current process.

Syntax

tempdb_id()

Examples

Finds all the server processes that are assigned to a given temporary database:

```
select spid from master..sysprocesses
    where tempdb_id(spid) = db_id("tempdatabase")
```

Usage

select tempdb_id gives the same result as select @@*tempdbid*.

See also

Commands select

textptr

Description
Returns a pointer to the first page of a text, image, or unitext column.

Syntax
textptr(*column_name*)

Parameters
column_name
is the name of a text column.

Examples
Example 1 Uses the textptr function to locate the text column, copy, associated with au_id 486-29-1786 in the author's blurbs table. The text pointer is placed in local variable *@val* and supplied as a parameter to the readtext command, which returns 5 bytes, starting at the second byte (offset of 1):

```
declare @val binary(16)
    select @val = textptr(copy) from blurbs
    where au_id = "486-29-1786"
    readtext blurbs.copy @val 1 5
```

Example 2 Selects the title_id column and the 16-byte text pointer of the copy column from the blurbs table:

```
select au_id, textptr(copy) from blurbs
```

Usage
- textptr, a text and image function, returns the text pointer value, a 16-byte varbinary value.
- The textptr value returned for an in-row LOB column residing in a data-only-locking data row that is row-forwarded remains unchanged and valid after the forwarding.
- If a text, unitext, or image column has not been initialized by a non-null insert or by any update statement, textptr returns a NULL pointer. Use textvalid to check whether a text pointer exists. You cannot use writetext or readtext without a valid text pointer.

Note Trailing `f` in varbinary values are truncated when they are stored in tables. If storing text pointer values in a table, use binary as the column's datatype.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute textptr.

See also
Datatypes text, image, and unitext datatypes

Documentation *Transact-SQL Users Guide*

Function textvalid

Commands insert, update, readtext, writetext

textvalid

Description: Returns 1 if the pointer to the specified text, unitext, in-row, and off-row LOB columns is valid; 0 if it is not.

Syntax: textvalid("*table_name.column_name*", *textpointer*)

Parameters:

table_name.column_name
is the name of a table and its text column.

textpointer
is a text pointer value.

Examples: Reports whether a valid text pointer exists for each value in the blurb column of the texttest table:

```
select textvalid ("texttest.blurb", textptr(blurb))
from texttest
```

Usage:

- textvalid checks that a given text pointer is valid. Returns 1 if the pointer is valid, or 0 if it is not.
- The identifier for the column must include the table name.
- For general information about text and image functions, see *Transact-SQL Users Guide*.

Standards: ANSI SQL – Compliance level: Transact-SQL extension.

Permissions: Any user can execute textvalid.

See also:

Datatypes text, image, and unitext datatypes

Documentation *Transact-SQL Users Guide*

Function textptr

to_unichar

Description

Returns a unichar expression having the value of the specified integer expression.

Syntax

to_unichar(*integer_expr*)

Parameters

integer_expr
is any integer (tinyint, smallint, or int) column name, variable, or constant expression.

Usage

- to_unichar, a string function, converts a Unicode integer value to a Unicode character value.
- If a unichar expression refers to only half of a surrogate pair, an error message appears and the operation is aborted.
- If a *integer_expr* is NULL, to_unichar returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute to_unichar.

See also

Datatypes text, image, and unitext datatypes

Documentation *Transact-SQL Users Guide*

Function char

tran_dumpable_status

Description

Returns a true/false indication of whether dump transaction is allowed.

Syntax

tran_dumpable_status("*database_name*")

Parameters

database_name
is the name of the target database.

Examples

Checks to see if the pubs2 database can be dumped:

```
1> select tran_dumpable_status("pubs2")
2> go

 -----------
         106

(1 row affected)
```

In this example, you cannot dump pubs2. The return code of 106 is a sum of all the conditions met (2, 8, 32, 64). See the Usage section for a description of the return codes.

Usage

tran_dumpable_status allows you to determine if dump transaction is allowed on a database without having to run the command. tran_dumpable_status performs all of the checks that Adaptive Server performs when dump transaction is issued.

If tran_dumpable_status returns 0, you can perform the dump transaction command on the database. If it returns any other value, it cannot. The non-0 values are:

- 1 – A database with the name you specified does not exist.
- 2 – A log does not exist on a separate device.
- 4 – The log first page is in the bounds of a data-only disk fragment.
- 8 – the trunc log on chkpt option is set for the database.
- 16 – Non-logged writes have occurred on the database.
- 32 – Truncate-only dump tran has interrupted any coherent sequence of dumps to dump devices.
- 64 – Database is newly created or upgraded. Transaction log may not be dumped until a dump database has been performed.
- 128 – Database durability does not allow transaction dumps.
- 256 – Database is read-only. dump transaction started a transaction, which is not allowed on read-only databases.

- 512 – Database is online for standby access. dump transaction started a transaction, which is not allowed on databases in standby access because the transactoin would disturb the load sequence.
- 1024 – Database is an archive database, which do not support dump transaction.

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute this function.

See also **Command** dump transaction

tsequal

Description

Compares timestamp values to prevent update on a row that has been modified since it was selected for browsing.

Syntax

tsequal(*browsed_row_timestamp*, *stored_row_timestamp*)

Parameters

browsed_row_timestamp
is the timestamp column of the browsed row.

stored_row_timestamp
is the timestamp column of the stored row.

Examples

Retrieves the timestamp column from the current version of the publishers table and compares it to the value in the timestamp column that has been saved. To add the timestamp column:

```
alter table publishers add timestamp
```

If the values in the two timestamp columns are equal, tsequal updates the row. If the values are not equal, tsequal returns the error message below:

```
update publishers
set city = "Springfield"
where pub_id = "0736"
and tsequal(timestamp, 0x0001000000002ea8)
Msg 532, Level 16, State 2:

Server 'server_name', Line 1:
The timestamp (changed to 0x0001000000002ea8) shows
that the row has been updated by another user.
Command has been aborted.
(0 rows affected)
```

Usage

- tsequal, a system function, compares the timestamp column values to prevent an update on a row that has been modified since it was selected for browsing. For general information about system functions, see *Transact-SQL Users Guide*.
- tsequal allows you to use browse mode without calling the dbqual function in DB-Library. Browse mode supports the ability to perform updates while viewing data. It is used in front-end applications using Open Client and a host programming language. A table can be browsed if its rows have been timestamped.
- To browse a table in a front-end application, append the for browse keywords to the end of the select statement sent to Adaptive Server. For example:

```
Start of select statement in an Open Client application
```

```
...
   for browse
```

Completion of the Open Client application routine

- Do not use tsequal in the where clause of a select statement; only in the where clause of insert and update statements where the rest of the where clause matches a single unique row.

  If you use a timestamp column as a search clause, compare it like a regular varbinary column; that is, timestamp1 = timestamp2.

Timestamping a new table for browsing

- When creating a new table for browsing, include a column named timestamp in the table definition. The column is automatically assigned a datatype of timestamp; you do not have to specify its datatype. For example:

```
create table newtable(col1 int, timestamp, col3 char(7))
```

  Whenever you insert or update a row, Adaptive Server timestamps it by automatically assigning a unique varbinary value to the timestamp column.

Timestamping an existing table

- To prepare an existing table for browsing, add a column named timestamp using alter table. For example, to add a timestamp column with a NULL value to each existing row:

  ```
  alter table oldtable add timestamp
  ```

  To generate a timestamp, update each existing row without specifying new column values:

  ```
  update oldtable
  set col1 = col1
  ```

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute tsequal.

See also **Datatype** Timestamp datatype

uhighsurr

Description

Returns 1 if the Unicode value at position start is the higher half of a surrogate pair (which should appear first in the pair). Otherwise, returns 0. This function allows you to write explicit code for surrogate handling.

Syntax

uhighsurr(*uchar_expr*, start)

Parameters

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

start
specifies the character position to investigate.

Usage

- uhighsurr, a string function, allows you to write explicit code for surrogate handling. Specifically, if a substring starts on a Unicode character where uhighsurr is true, extract a substring of at least 2 Unicode values (*substr* does not extract half of a surrogate pair).
- If *uchar_expr* is NULL, uhighsurr returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute uhighsurr.

See also

Documentation *Transact-SQL Users Guide*

Function ulowsurr

ulowsurr

Description

Returns 1 if the Unicode value at *start* is the low half of a surrogate pair (which should appear second in the pair). Otherwise, returns 0. This function allows you to explicitly code around the adjustments performed by substr(), stuff(), and right().

Syntax

ulowsurr(*uchar_expr*, start)

Parameters

uchar_expr
is a character-type column name, variable, or constant expression of unichar or univarchar type.

start
specifies the character position to investigate.

Usage

- ulowsurr, a string function, allows you to write explicit code around adjustments performed by substr, stuff, and right. Specifically, if a substring ends on a Unicode value where ulowsurr is true, the user knows to extract a substring of 1 less characters (or 1 more). substr does not extract a string that contains an unmatched surrogate pair.
- If *uchar_expr* is NULL, ulowsurr returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute ulowsurr.

See also

Documentation *Transact-SQL Users Guide*

Function uhighsurr

upper

Description

Converts specified lowercase string to the uppercase equivalent.

Syntax

upper(*char_expr*)

Parameters

char_expr
is a character-type column name, variable, or constant expression of char, unichar, varchar, nchar, nvarchar, or univarchar type.

Examples

```
select upper("abcd")

----
ABCD
```

Usage

- upper, a string function, converts lowercase to uppercase, returning a character value.
- If *char_expr* or *uchar_expr* is NULL, upper returns NULL.
- Characters that have no upper-ase equivalent are left unmodified.
- If a unichar expression is created containing only half of a surrogate pair, an error message appears and the operation is aborted.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute upper.

See also

Documentation *Transact-SQL Users Guide*

Function lower

uscalar

Description
Returns the Unicode scalar value for the first Unicode character in an expression.

Syntax
uscalar(*uchar_expr*)

Parameters
uchar_expr
is a character-type column name, variable, or constant expression of unichar, or univarchar type.

Usage
- uscalar, a string function, returns the Unicode value for the first Unicode character in an expression.
- If *uchar_expr* is NULL, returns NULL.
- If uscalar is called on a *uchar_expr* containing an unmatched surrogate half, and error occurs and the operation is aborted.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute uscalar.

See also
Documentation *Transact-SQL Users Guide*

Functions ascii

used_pages

Description

Reports the number of pages used by a table, an index, or a specific partition. Unlike data_pages, used_pages does include pages used for internal structures. This function replaces the used_pgs function used in versions of Adaptive Server earlier than 15.0.

Syntax

used_pages(*dbid*, *object_id*[, *indid*[, *ptnid*]])

Parameters

dbid
is the database id where target object resides.

object_id
is the object ID of the table for which you want to see the used pages. To see the pages used by an index, specify the object ID of the table to which the index belongs.

indid
is the index id of interest.

ptnid
is the partition id of interest.

Examples

Example 1 Returns the number of pages used by the object with a object ID of 31000114 in the specified database (including any indexes):

```
select used_pages(5, 31000114)
```

Example 2 Returns the number of pages used by the object in the data layer, regardless of whether or not a clustered index exists:

```
select used_pages(5, 31000114, 0)
```

Example 3 Returns the number of pages used by the object in the index layer for an index with index ID 2. This does not include the pages used by the data layer (See the first bullet in the Usage section for an exception):

```
select used_pages(5, 31000114, 2)
```

Example 4 Returns the number of pages used by the object in the data layer of the specific partition, which in this case is 2323242432:

```
select used_pages(5, 31000114, 0, 2323242432)
```

Usage

- In an all-pages locked table with a clustered index, the value of the last parameter determines which pages used are returned:
  - used_pages(dbid, objid, 0) – which explicitly passes 0 as the index ID, returns only the pages used by the data layer.

- used_pages(dbid, objid, 1) – returns the pages used by the index layer as well as the pages used by the data layer.

  To obtain the index layer used pages for an all-pages locked table with a clustered index, subtract used_pages(dbid, objid, 0) from used_pages(dbid, objid, 1).

- Instead of consuming resources, used_pages discards the descriptor for an object that is not already in the cache.
- In in an all-pages-locked table with a clustered index, used_pages is passed only the used pages in the data layer, for a value of `indid = 0`. When `indid=1` is passed, the used pages at the data layer and at the clustered index layer are returned, as in previous versions.
- used_pages is similar to the old used_pgs(objid, doampg, ioampg) function.
- All erroneous conditions result in a return value of zero.

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute used_pgs.

See also — **Functions** data_pages, object_id

user

Description Returns the name of the current user.

Syntax user

Parameters None.

Examples

```
select user

------
dbo
```

Usage

- user, a system function, returns the user's name.
- If the sa_role is active, you are automatically the Database Owner in any database you are using. Inside a database, the user name of the Database Owner is always "dbo".

Standards ANSI SQL – Compliance level: Transact-SQL extension.

Permissions Any user can execute user.

See also **Documentation** *Transact-SQL Users Guide*

Functions user_name

user_id

Description

Returns the ID number of the specified user or of the current user in the database.

Syntax

user_id([*user_name*])

Parameters

user_name
is the name of the user.

Examples

Example 1

```
select user_id()

------
     1
```

Example 2

```
select user_id("margaret")

------
     4
```

Usage

- user_id, a system function, returns the user's ID number. For general information about system functions, see *Transact-SQL Users Guide*.
- user_id reports the number from sysusers in the current database. If no *user_name* is supplied, user_id returns the ID of the current user. To find the server user ID, which is the same number in every database on Adaptive Server, use suser_id.
- Inside a database, the "guest" user ID is always 2.
- Inside a database, the user_id of the Database Owner is always 1. If you have the sa_role active, you are automatically the Database Owner in any database you are using. To return to your actual user ID, use set sa_role off before executing user_id. If you are not a valid user in the database, Adaptive Server returns an error when you use set sa_role off.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

You must System Administrator or System Security Officer to use this function on a user_name other than your own.

See also

Commands setuser

Documentation *Transact-SQL Users Guide*

Functions suser_id, user_name

user_name

Description

Returns the name within the database of the specified user or of the current user.

Syntax

user_name([*user_id*])

Parameters

user_id
is the ID of a user.

Examples

Example 1

```
select user_name()

------------------------------
dbo
```

Example 2

```
select user_name(4)

------------------------------
margaret
```

Usage

- user_name, a system function, returns the user's name, based on the user's ID in the current database.
- If no *user_id* is supplied, user_name returns the name of the current user.
- If the sa_role is active, you are automatically the Database Owner in any database you are using. Inside a database, the user_name of the Database Owner is always "dbo".

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

You must be a System Administrator or System Security Officer to use this function on a user_id other than your own.

See also

Documentation *Transact-SQL Users Guide*

Functions suser_name, user_id

valid_name

Description

Returns 0 if the specified string is not a valid identifier or a number other than 0 if the string is a valid identifier, and can be up to 255 bytes in length.

Syntax

valid_name(*character_expression*[, *maximum_length*])

Parameters

character_expression
is a character-type column name, variable, or constant expression of char, varchar, nchar or nvarchar type. Constant expressions must be enclosed in quotation marks.

maximum_length
is an integer larger than 0 and less than or equal to 255. The default value is 30. If the identifier length is larger than the second argument, valid_name returns 0, and returns a value greater than zero if the identifier length is invalid.

Examples

Creates a procedure to verify that identifiers are valid:

```
create procedure chkname
@name varchar(30)
as
     if valid_name(@name) = 0
     print "name not valid"
```

Usage

- valid_name, a system function, returns 0 if the *character_expression* is not a valid identifier (illegal characters, more than 30 bytes long, or a reserved word), or a number other than 0 if it is a valid identifier.
- Adaptive Server identifiers can be a maximum of 16384 bytes in length, whether single-byte or multibyte characters are used. The first character of an identifier must be either an alphabetic character, as defined in the current character set, or the underscore (_) character. Temporary table names, which begin with the pound sign (#), and local variable names, which begin with the at sign (@), are exceptions to this rule. valid_name returns 0 for identifiers that begin with the pound sign (#) and the at sign (@).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute valid_name.

See also

Documentation *Transact-SQL Users Guide*

System procedure sp_checkreswords

valid_user

Description
Returns 1 if the specified ID is a valid user or alias in at least one database.

Syntax
valid_user(*server_user_id* [, *database_id*])

Parameters
server_user_id
is a server user ID. Server user IDs are stored in the suid column of syslogins.

database_id
is the ID of the database on which you are determining if the user is valid. Database IDs are stored in the dbid column of sysdatabases.

Examples
Example 1 User with an suid of 4 is a valid user or alias in at least one database:

```
select valid_user(4)
---------------
              1
```

Example 2 User with an suid of 4 is a valid user or alias in the database with an ID of 6.

```
select valid_user(4,6)
---------------
              1
```

Usage
- valid_user returns 1 if the specified *server_user_id* is a valid user or alias in the specified *database_id*.
- If you do not specify a *database_id*, or if it is 0, valid_user determines if the user is a valid user or alias on at least one database.

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
The permission checks for valid_user differ based on your granular permissions settings.

Granular permissions enabled	With granular permissions enabled, you must have manage any login or manage server permission to execute valid_user on a server_user_id other than your own.
Granular permissions disabled	With granular permissions disabled, you must be a user with sa_role or sso_role to execute valid_user on a server_user_id other than your own.

See also
Documentation *Transact-SQL Users Guide*

System procedures sp_addlogin, sp_adduser

var

Description

Computes the statistical variance of a sample consisting of a numeric expression, as a double, and returns the variance of a set of numbers.

Note var and variance are aliases of var_samp. See var_samp on page 323 for details.

---

var_pop

Description — Computes the statistical variance of a population consisting of a numeric expression, as a double. varp is an alias for var_pop, and uses the same syntax.

Syntax — var_pop ([all | distinct] *expression*)

Parameters

all
: applies var_pop to all values. all is the default.

distinct
: eliminates duplicate values before var_pop is applied.

expression
: is an expression—commonly a column name—in which its population-based variance is calculated over a set of rows.

Examples — Lists the average and variance of the advances for each type of book in the pubs2 database:

```
select type, avg(advance) as "avg", var_pop(advance)
  as "variance" from titles group by type order by type
```

Usage — Computes the population variance of the provided value expression evaluated for each row of the group (if distinct was specified, then each row that remains after duplicates have been eliminated), defined as the sum of squares of the difference of value expression, from the mean of value expression, divided by the number of rows in the group or partition.

Figure 2-3: The formula for population-related statistical aggregate functions

The formula that defines the variance of the population of size *n* having mean μ (var_pop) is as follows. The population standard deviation (stddev_pop) is the positive square root of this.

$$\sigma^2 = \frac{\sum (x_i - \mu)^2}{n}$$

σ^2 = Variance

n = Population size

μ = Mean of the values x_i

Standards — ANSI SQL – Compliance level: Transact-SQL extension.

Permissions — Any user can execute var_pop.

See also — For general information about aggregate functions, see “Aggregate functions” in *Adaptive Server Enterprise Reference Manual: Building Blocks*.

Functions stddev_pop, stddev_samp, var_samp

var_samp

Description

Computes the statistical variance of a sample consisting of a numeric-expression, as a double, and returns the variance of a set of numbers. var and variance are aliases of var_samp, and use the same syntax.

Syntax

var_samp ([all | distinct] *expression*)

Parameters

all
applies var_samp to all values. all is the default.

distinct
eliminates duplicate values before var_samp is applied.

expression
is any numeric datatype (float, real, or double) expression.

Examples

Lists the average and variance of the advances for each type of book in the pubs2 database:

```
select type, avg(advance) as "avg", var_samp(advance)
  as "variance" from titles where
  total_sales > 2000 group by type order by type
```

Usage

var_samp returns a result of double-precision floating-point datatype. If applied to the empty set, the result is NULL.

Figure 2-4: The formula for sample-related statistical aggregate functions

The formula that defines an unbiased estimate of the population variance from a sample of size *n* having mean $\bar{x}$ (var_samp) is as follows. The sample standard deviation (stddev_samp) is the positive square root of this.

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n - 1}$$

s^2 = Variance

n = Sample size

$\bar{x}$ = Mean of the values x_i

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute var_samp.

See also

For general information about aggregate functions, see “Aggregate functions” in *Adaptive Server Enterprise Reference Manual: Building Blocks*.

Functions stddev_pop, stddev_samp, var_pop

variance

Description

Computes the statistical variance of a sample consisting of a numeric expression, as a double, and returns the variance of a set of numbers.

Note var and variance are aliases of var_samp. See var_samp on page 323 for details.

---

varp

Description

Computes the statistical variance of a population consisting of a numeric expression, as a double.

Note varp is an alias of var_pop. See var_pop on page 322 for details.

workload_metric

Description

(Cluster environments only) Queries the current workload metric for the instance you specify, or updates the metric for the instance you specify.

Syntax

workload_metric(*instance_id* | *instance_name* [, *new_value*])

Parameters

instance_id
ID of the instance.

instance_name
name of the instance.

new_value
float value representing the new metric.

Examples

Example 1 Sees the user metric on the current instance:

```
select workload_metric()
```

Example 2 Sees the user metric on instance “ase2”:

```
select workload_metric("ase2")
```

Example 3 Sets the value of the user metric on “ase3” to 27.54:

```
select workload_metric("ase3", 27.54)
```

Usage

- A NULL value indicates the current instance.
- If a value is specified for *new_value*, the specified value becomes the current user metric. If a value is not specified for *new_value*, the current workload metric is returned.
- The value of *new_value* must be zero or greater.
- If a value is supplied for *new_value*, workload_metric returns that value if the operation is successful. Otherwise, workload_metric returns -1.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

You must have the sa_role or ha_role to execute workload_metric

xa_bqual

Description

Returns the binary version of the bqual component of an ASCII XA transaction ID.

Syntax

xa_bqual(*xid*, 0)

Parameters

xid
is the ID of an Adaptive Server transaction, obtained from the xactname column in systransactions or from sp_transactions.

0
is reserved for future use

Examples

Example 1 Returns “0x227f06ca80”, the binary translation of the branch qualifier for the Adaptive Server transaction ID “0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0”. The Adaptive Server transaction ID is first obtained using sp_transactions:

```
1> sp_transactions

xactkey                        type     coordinator starttime          st
ate      connection dbid  spid  loid  failover    srvname  namelen  xactna
me
------------------------------ -------- ----------- ------------------ --
-------- ---------- ----- ----- ----- ---------- -------  -------  ------
---------------------------------
0x531600000600000017e4885b0700 External XA          Dec 9 2005  5:15PM In
Command  Attached     7   20    877  Resident Tx  NULL         39
0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0

1> select xa_bqual("0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0", 0)
2> go

...
--------------------------------------------------------------------
0x227f06ca80
```

Example 2 xa_bqual is often used together with xa_gtrid. This example returns the global transaction IDs and branch qualifiers from all rows in systransactions where its coordinator column is the value of “3”:

```
1> select gtrid=xa_gtrid(xactname,0),
    bqual=xa_bqual(xactname,0)
    from systransactions where coordinator = 3
2> go
        gtrid

        bqual
```

```
----------------------------------------------------------------------------
          0xb1946cdc52464a61cba42fe4e0f5232b

          0x227f06ca80
```

Usage

If an external transaction is blocked on Adaptive Server and you are using sp_lock and sp_transactions to identify the blocking transaction, you can use the XA transaction manager to terminate the global transaction. However, when you execute sp_transactions, the value of *xactname* it returns is in ASCII string format, while XA Server uses an undecoded binary value. Using xa_bqual thus allows you to determine the bqual portion of the transaction name in a format that can be understood by the XA transaction manager.

xa_bqual returns:

- The translated version of this string that follows the second "_" (underscore) and preceeds either the third "_" or end-of-string value, whichever comes first.
- NULL if the transaction ID cannot be decoded, or is in an unexpected format.

Note xa_bqual does not perform a validation check on the xid, but only returns a translated string.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can use xa_bqual.

See also

Functions xa_gtrid

Stored procedures sp_lock, sp_transactions

xa_gtrid

Description

Returns the binary version of the gtrid component of an ASCII XA transaction ID.

Syntax

xa_gtrid(*xactname*, *int*)

Parameters

xid

is the ID of an Adaptive Server transaction, obtained from the xactname column in systransactions or from sp_transactions.

0

is reserved for future use

Examples

Example 1 In this typical situation, returns "0x227f06ca80," the binary translation of the branch qualifier, and "0xb1946cdc52464a61cba42fe4e0f5232b," the global transaction ID, for the Adaptive Server transaction ID "0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0":

```
1> select xa_gtrid("0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0", 0)
2> go

       ...
---------------------------------------------------------------------------
          0xb1946cdc52464a61cba42fe4e0f5232b

(1 row affected)
```

Example 2 xa_bqual is often used together with xa_gtrid. This example returns the global transaction IDs and branch qualifiers from all rows in systransactions where its coordinator column is the value of "3":

```
1> select gtrid=xa_gtrid(xactname,0),
    bqual=xa_bqual(xactname,0)
    from systransactions where coordinator = 3
2> go
        gtrid

        bqual

---------------------------------------------------------------------------
         0xb1946cdc52464a61cba42fe4e0f5232b

         0x227f06ca80
```

Usage

If an external transaction is blocked on Adaptive Server and you are using sp_lock and sp_transactions to identify the blocking transaction, you can use the XA transaction manager to terminate the global transaction. However, when you execute sp_transactions, the value of *xactname* it returns is in ASCII string format, while XA Server uses an undecoded binary value. Using xa_gtrid thus allows you to determine the gtrid portion of the transaction name in a format that can be understood by the XA transaction manager.

xa_gtrid returns:

- The translation version of tis string that follows the first "_" (underscore) and preceeds either the second "_" or end-of-string value, whichever comes first.
- NULL if the transaction ID cannot be decoded, or is in an unexpected format.

Note xa_gtrid does not perform a validation check on the xid, but only returns a translated string.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can use xa_gtrid.

See also

Functions xa_bqual

Stored procedures sp_lock, sp_transactions

xact_connmigrate_check

Description

(Cluster environments only) Determines whether or not a connection can process an external transaction.

Syntax

xact_connmigrate_check("*txn_name*")

Parameters

txn_name
is a transaction ID. This parameter is optional.

Examples

Example 1 An XA transaction "txn_name" is running on instance "ase1".

```
select xact_connmigrate_check("txn_name")
--------
    1
```

Example 2 An XA transaction "txn_name" is running on instance "ase2". The connection can migrate.

```
select xact_connmigrate_check("txn_name")
--------
    1
```

Example 3 An XA transaction "txn_name" is running on instance "ase2". The connection cannot migrate.

```
select xact_connmigrate_check("txn_name")
--------
    0
```

Usage

If an XID is specified, xact_connmigrate_check returns:

- 1 if the connection is to the instance running the specified transaction, or the connection is to another instance in a migratable state
- 0 if the connection or transaction ID does not exist, or the connection is to another instance that is not in a migratable state

If an XID is not specified, xact_connmigrate_check returns:

- 1 if the connection is in a migratable state
- 0 if the connection does not exist or is not in a migratable state

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute xact_connmigrate_check.

See also

Functions xact_owner_instance

xact_owner_instance

Description

(Cluster environments only) Returns the instance ID on which the distributed transaction is running.

Syntax

xact_owner_instance(“*txn_name*”)

Parameters

txn_name
is a transaction ID.

Examples

Example 1 An XA transaction “txn_name” is running on instance “ase1”.

```
select xact_owner_instance(txn_name)
-------
    1
```

Example 2 An XA transaction “txn_name” is not running.

```
select xact_owner_instance(txn_name)
-------
  NULL
```

Usage

xact_owner_instance returns:

- The instance ID of the instance running the transaction, or
- Null, if the transaction is not running

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute xact_owner_instance.

See also

Functions xact_connmigrate_check

xmlextract

Description	Applies an XML query expression to an XML document and returns the specified result. Information can be returned with or without the XML tags.
See also	See *XML Services* for syntax, examples, and usage information for xmlextract and all other Transact-SQL functions that support XML in the database.

xmlparse

Description

Parses an XML document passed as a parameter, and returns an image (default), binary, or varbinary value that contains a parsed form of the document.

See also

See XML Services for syntax, examples, and usage information for xmlparse and all other Transact-SQL functions that support XML in the database.

xmlrepresentation

Description	Examines the image parameter of an expression, and returns an integer value that indicates whether the parameter contains parsed XML data or another sort of image data.
See also	See XML Services for syntax, examples, and usage information for xmlrepresentation and all other Transact-SQL functions that support XML in the database.

xmltable

Description: Extracts data from an XML document and returns it as a SQL table.

See also: See XML Services for syntax, examples, and usage information for xmltable and all other Transact-SQL functions that support XML in the database.

xmltest

Description

Is a SQL predicate that evaluates an XML query expression, which can reference the XML document parameter, and returns a Boolean result. xmltest resembles a SQL like predicate.

See also

See XML Services for syntax, examples, and usage information for xmltest and all other Transact-SQL functions that support XML in the database.

xmlvalidate

Description

Validates an XML document.

See also

See XML Services for syntax, examples, and usage information for xmlvalidate and all other Transact-SQL functions that support XML in the database.

year

Description
Returns an integer that represents the year in the datepart of a specified date.

Syntax
year(*date_expression*)

Parameters
date_expression
is an expression of type datetime, smalldatetime, date, time or a character string in a datetime format.

Examples
Returns the integer 03:

```
year("11/02/03")
----------
03
(1 row(s) affected)
```

Usage
year(*date_expression*) is equivalent to datepart(*yy*, *date_expression*).

Standards
ANSI SQL – Compliance level: Transact-SQL extension.

Permissions
Any user can execute year.

See also
Datatypes datetime, smalldatetime, date

Functions datepart, day, month

CHAPTER 3

Global Variables

Adaptive Server global variables

Global variables are system-defined variables updated by Adaptive Server while the system is running. Some global variables are session-specific, while others are server instance-specific. For example, *@@error* contains the last error number generated by the system for a given user connection.

See get_appcontext and set_appcontext to specify application context variables.

To view the value for any global variable, enter:

select *variable_name*

For example:

```
select @@char_convert
```

Many global variables report on system activity occurring from the last time Adaptive Server was started. sp_monitor displays the current values of some of the global variables.

Table 3-1 lists the global variables available for Adaptive Server:

Table 3-1: Adaptive Server global variables

Global variable	Definition
@@active_instances	Returns the number of active instances in the cluster
@@authmech	A read-only variable that indicates the mechanism used to authenticate the user.
@@bootcount	Returns the number of times an Adaptive Server installation has been booted.
@@boottime	Returns the date and time Adaptive Server was last booted.
@@bulkarraysize	Returns the number of rows to be buffered in local server memory before being transferred using the bulk copy interface Used only with Component Integration Services for transferring rows to a remote server using select into. See the *Component Integration Services User's Guide*.
@@bulkbatchsize	Returns the number of rows transferred to a remote server via select into *proxy_table* using the bulk interface. Used only with Component Integration Services for transferring rows to a remote server using select into. See the *Component Integration Services User's Guide*.
@@char_convert	Returns 0 if character set conversion is not in effect. Returns 1 if character set conversion is in effect.

Global variable	Definition
@@cis_rpc_handling	Returns 0 if cis rpc handling is off. Returns 1 if cis rpc handling is on. See the *Component Integration Services User's Guide*.
@@cis_version	Returns the date and version of Component Integration Services.
@@client_csexpansion	Returns the expansion factor used when converting from the server character set to the client character set. For example, if it contains a value of 2, a character in the server character set could take up to twice the number of bytes after translation to the client character set.
@@client_csid	Returns -1 if the client character set has never been initialized; returns the client character set ID from syscharsets for the connection if the client character set has been initialized.
@@client_csname	Returns NULL if client character set has never been initialized; returns the name of the character set for the connection if the client character set has been initialized.
@@clusterboottime	Returns the date and time the cluster was first started, even if the instance that originally started the cluster start has shut down
@@clustercoordid	Returns the instance id of the current cluster coordinator
@@clustermode	Returns the string: "shared-disk cluster"
@@clustername	Returns the name of the cluster
@@cmpstate	Returns the current mode of Adaptive Server in a high availability environment. Not used in a non-high availability environment.
@@connections	Returns the number of user logins attempted.
@@cpu_busy	Returns the amount of time, in ticks, that the CPU has spent doing Adaptive Server work since the last time Adaptive Server was started.

@@cursor_rows	A global variable designed specifically for scrollable cursors. Displays the total number of rows in the cursor result set. Returns the following values:
	• -1 – the cursor is:
	  • Dynamic – because dynamic cursors reflect all changes, the number of rows that qualify for the cursor is constantly changing. You can never be certain that all the qualified rows are retrieved.
	  • semi_sensitive and scrollable, but the scrolling worktable is not yet fully populated – the number of rows that qualify the cursor is unknown at the time this value is retrieved.
	• 0 – either no cursors are open, no rows qualify for the last opened cursor, or the last open cursor is closed or deallocated.
	• *n* – the last opened or fetched cursor result set is fully populated. The value returned is the total number of rows in the cursor result set.

@@curloid	Returns the curent session's lock owner ID.

Global variable	Definition
@@datefirst	Set using set datefirst *n* where *n* is a value between 1 and 7. Returns the current value of *@@datefirst*, indicating the specified first day of each week, expressed as tinyint. The default value in Adaptive Server is Sunday (based on the us_language default), which you set by specifying `set datefirst 7`. See the datefirst option of the set command for more information on settings and values.

@@dbts	Returns the timestamp of the current database.
	Timestamp columns always display values in big-endian byte order, but on little-endian platforms, *@@dbts* is displayed in little-endian byte order. To convert a little-endian *@@dbts* value to a big-endian value that can be compared with timestamp column values, use:
	`reverse(substring(@@dbts,1,2)) + 0x0000 +`
	`reverse(substring(@@dbts,5,4))`

@@error	Returns the error number most recently generated by the system.
@@errorlog	Returns the full path to the directory in which the Adaptive Server error log is kept, relative to *$SYBASE* directory (*%SYBASE%* on NT).
@@failedoverconn	Returns a value greater than 0 if the connection to the primary companion has failed over and is executing on the secondary companion server. Used only in a high availability environment, and is session-specific.
@@fetch_status	Returns: • 0 – fetch operation successful • -1 – fetch operation unsuccessful • -2 – value reserved for future use
@@guestuserid	Returns the ID of the guest user.
@@hacmpservername	Returns the name of the companion server in a high availability setup.
@@haconnection	Returns a value greater than 0 if the connection has the failover property enabled. This is a session-specific property.
@@heapmemsize	Returns the size of the heap memory pool, in bytes. See the *System Administration Guide* for more information on heap memory.
@@identity	Returns the most recently generated IDENTITY column value.
@@idle	Returns the amount of time, in ticks, that Adaptive Server has been idle since it was last started.
@@instanceid	Returns the id of the instance from which it was executed
@@instancename	Returns the name of the instance from which it was executed
@@invaliduserid	Returns a value of -1 for an invalid user ID.
@@io_busy	Returns the amount of time, in ticks, that Adaptive Server has spent doing input and output operations.
@@isolation	Returns the value of the session-specific isolation level (0, 1, or 3) of the current Transact-SQL program.
@@jsinstanceid	ID of the instance on which the Job Scheduler is running, or will run once enabled.

Global variable	Definition
@@kernel_addr	Returns the starting address of the first shared memory region that contains the kernel region. The result is in the form of 0x*address pointer value*.
@@kernel_size	Returns the size of the kernel region that is part of the first shared memory region.
@@kernelmode	Returns the mode (threaded or process) for which Adaptive Server is configured.
@@langid	Returns the server-wide language ID of the language in use, as specified in syslanguages.langid.
@@language	Returns the name of the language in use, as specified in syslanguages.name.
@@lastkpgendate	Returns the date and time of when the last key pair was generated as set by sp_passwordpolicy's "keypair regeneration period" policy option.
@@lastlogindate	Available to each user login session, *@@lastlogindate* includes a datetime datatype, its value is the lastlogindate column for the login account before the current session was established. This variable is specific to each login session and can be used by that session to determine the previous login to the account. If the account has not been used previously or "sp_passwordpolicy 'set', enable last login updates" is 0, then the value of *@@lastlogindate* is NULL.
@@lock_timeout	Set using set lock wait n. Returns the current *lock_timeout* setting, in milliseconds. *@@lock_timeout* returns the value of n. The default value is no timeout. If no set lock wait n is executed at the beginning of the session, *@@lock_timeout* returns -1.
@@lwpid	Returns the object ID of the next most recently run lightweight procedure.
@@max_connections	Returns the maximum number of simultaneous connections that can be made with Adaptive Server in the current computer environment. You can configure Adaptive Server for any number of connections less than or equal to the value of *@@max_connections* with the number of user connections configuration parameter.
@@max_precision	Returns the precision level used by decimal and numeric datatypes set by the server. This value is a fixed constant of 38.
@@maxcharlen	Returns the maximum length, in bytes, of a character in Adaptive Server's default character set.
@@maxgroupid	Returns the highest group user ID. The highest value is 1048576.
@@maxpagesize	Returns the server's logical page size.
@@maxspid	Returns maximum valid value for the spid.
@@maxsuid	Returns the highest server user ID. The default value is 2147483647.
@@maxuserid	Returns the highest user ID. The highest value is 2147483647.
@@mempool_addr	Returns the global memory pool table address. The result is in the form 0x*address pointer value*. This variable is for internal use.
@@min_poolsize	Returns the minimum size of a named cache pool, in kilobytes. It is calculated based on the DEFAULT_POOL_SIZE, which is 256, and the current value of max database page size.
@@mingroupid	Returns the lowest group user ID. The lowest value is 16384.
@@minspid	Returns 1, which is the lowest value for spid.
@@minsuid	Returns the minimum server user ID. The lowest value is -32768.

Global variable	Definition
@@minuserid	Returns the lowest user ID. The lowest value is -32768.
@@monitors_active	Reduces the number of messages displayed by sp_sysmon.
@@ncharsize	Returns the maximum length, in bytes, of a character set in the current server default character set.
@@nestlevel	Returns the current nesting level.
@@nextkpgendate	Returns the date and time of when the next key pair scheduled to be generated, as set by sp_passwordpolicy's "keypair regeneration period" policy option.
@@nodeid	Returns the current installation's 48-bit node identifier. Adaptive Server generates a nodeid the first time the master device is first used, and uniquely identifies an Adaptive Server installation.
@@optgoal	Returns the current optimization goal setting for query optimization.
@@optoptions	Returns a bitmap of active options.
@@options	Returns a hexadecimal representation of the session's set options.
@@optlevel	Returns the currently optimization level setting.
@@opttimeoutlimit	Returns the current optimization timeout limit setting for query optimization
@@ospid	(Threaded mode only) Returns the operating system ID for the server.
@@pack_received	Returns the number of input packets read by Adaptive Server.
@@pack_sent	Returns the nmber of output packets written by Adaptive Server.
@@packet_errors	Returns the number of errors detected by Adaptive Server while reading and writing packets.
@@pagesize	Returns the server's virtual page size.
@@parallel_degree	Returns the current maximum parallel degree setting.
@@plwpid	Returns the object ID of the most recently prepared lightweight procedure.
@@probesuid	Returns a value of 2 for the probe user ID.
@@procid	Returns the stored procedure ID of the currently executing procedure.
@@quorum_physname	Returns the physical path for the quorum device
@@recovery_state	Indicates whether Adaptive Server is in recovery based on these returns: • NOT_IN_RECOVERY – Adaptive Server is not in startup recovery or in failover recovery. Recovery has been completed and all databases that can be online are brought online. • RECOVERY_TUNING – Adaptive Server is in recovery (either startup or failover) and is tuning the optimal number of recovery tasks. • BOOTIME_RECOVERY – Adaptive Server is in startup recovery and has completed tuning the optimal number of tasks. Not all databases have been recovered. • FAILOVER_RECOVER – Adaptive Server is in recovery during an HA failover and has completed tuning the optimal number of recovery tasks. All databases are not brought online yet.

Global variable	Definition
@@remotestate	Returns the current mode of the primary companion in a high availability environment. For values returned, see *Using Sybase Failover in a High Availability Environment*.
@@repartition_degree	Returns the current dynamic repartitioning degree setting
@@resource_granularity	Returns the maximum resource usage hint setting for query optimization
@@rowcount	Returns the number of rows affected by the last query. The value of *@@rowcount* is affected by whether the specified cursor is forward-only or scrollable. If the cursor is the default, non-scrollable cursor, the value of *@@rowcount* increments one by one, in the forward direction only, until the number of rows in the result set are fetched.These rows are fetched from the underlying tables to the client. The maximum value for *@@ rowcount* is the number of rows in the result set. In the default cursor, *@@rowcount* is set to 0 by any command that does not return or affect rows, such as an if or set command, or an update or delete statement that does not affect any rows. If the cursor is scrollable, there is no maximum value for *@@rowcount*. The value continues to increment with each fetch, regardless of direction, and there is no maximum value. The *@@rowcount* value in scrollable cursors reflects the number of rows fetched from the result set, not from the underlying tables, to the client.
@@scan_parallel_degree	Returns the current maximum parallel degree setting for nonclustered index scans.
@@servername	Returns the name of Adaptive Server.
@@setrowcount	Returns the current value for set rowcount
@@shmem_flags	Returns the shared memory region properties. This variable is for internal use. There are a total of 13 different properties values corresponding to 13 bits in the integer. The valid values represented from low to high bit are: MR_SHARED, MR_SPECIAL, MR_PRIVATE, MR_READABLE, MR_WRITABLE, MR_EXECUTABLE, MR_HWCOHERENCY, MR_SWCOHERENC, MR_EXACT, MR_BEST, MR_NAIL, MR_PSUEDO, MR_ZERO.
@@spid	Returns the server process ID of the current process.
@@sqlstatus	Returns status information (warning exceptions) resulting from the execution of a fetch statement.
@@ssl_ciphersuite	Returns NULL if SSL is not used on the current connection; otherwise, it returns the name of the cipher suite you chose during the SSL handshake on the current connection.
@@stringsize	Returns the amount of character data returned from a toString() method. The default is 50. Max values may be up to 2GB. A value of zero specifies the default value. See the *Component Integration Services User's Guide* for more information.
@@sys_tempdbid	Returns the database id of the executing instance's effective local system temporary database
@@system_busy	Number of ticks during which Adaptive Server was running a system task[1]
@@system_view	Returns the session-specific system view setting, either "instance" or "cluster"

Global variable	Definition
@@tempdbid	Returns a valid temporary database ID (dbid) of the session's assigned temporary database.
@@textcolid	Returns the column ID of the column referenced by *@@textptr*.
@@textdataptnid	Returns the partition ID of a text partition containing the column referenced by *@@textptr*.
@@textdbid	Returns the database ID of a database containing an object with the column referenced by *@@textptr*.
@@textobjid	Returns the object ID of an object containing the column referenced by *@@textptr*.
@@textptnid	Returns the partition ID of a data partition containing the column referenced by @@textptr.
@@textptr	Returns the text pointer of the last text, unitext, or image column inserted or updated by a process (Not the same as the textptr function).
@@textptr_parameters	Returns 0 if the current status of the textptr_parameters configuration parameter is off. Returns 1 if the current status of the textptr_parameters if on. See the *Component Integration Services User's Guide* for more information.
@@textsize	Returns the limit on the number of bytes of text, unitext, or image data a select returns. Default limit is 32K bytes for isql; the default depends on the client software. Can be changed for a session with set textsize.
@@textts	Returns the text timestamp of the column referenced by *@@textptr*.
@@thresh_hysteresis	Returns the decrease in free space required to activate a threshold. This amount, also known as the hysteresis value, is measured in 2K database pages. It determines how closely thresholds can be placed on a database segment.
@@timeticks	Returns the number of microseconds per tick. The amount of time per tick is machine-dependent.
@@total_errors	Returns the number of errors detected by Adaptive Server while reading and writing.
@@total_read	Returns the number of disk reads by Adaptive Server.
@@total_write	Returns the number of disk writes by Adaptive Server.
@@tranchained	Returns 0 if the current transaction mode of the Transact-SQL program is unchained. Returns 1 if the current transaction mode of the Transact-SQL program is chained.
@@trancount	Returns the nesting level of transactions in the current user session.
@@transactional_rpc	Returns 0 if RPCs to remote servers are transactional. Returns 1 if RPCs to remote servers are not transactional. See enable xact coordination and set option transactional_rpc in the *Reference Manual*. Also, see the *Component Integration Services User's Guide*.
@@transtate	Returns the current state of a transaction after a statement executes in the current user session.
@@unicharsize	Returns 2, the size of a character in unichar.
@@user_busy	Number of ticks during which Adaptive Server was running a user task[1]
@@version	Returns the date, version string, and so on of the current release of Adaptive Server.

Global variable	Definition
@@version_as_integer	Returns the number of the last upgrade version of the current release of Adaptive Server as an integer. For example, *@@version_as_integer* returns 12500 if you are running Adaptive Server version 12.5, 12.5.0.3, or 12.5.1.
@@version_number	Returns the whole version of the current release of Adaptive Server as an integer

[1]The value of *@@user_busy* + *@@system_busy* should equal the value of *@@cpu_busy*

Using global variables in a clustered environment

For *@@servername*, the Cluster Edition returns the name of the cluster, not the instance name. Use *@@instancename* to return the name of the instance.

In a non-clustered Adaptive Server environment, the value for *@@identity* changes for every record inserted. If the most recent record inserted contains a column with the IDENTITY property, *@@identity* is set to the value of this column, otherwise it is set to “0” (an invalid value). This variable is session-specific, and takes its value based on the last insert that occurred during this session.

In a clustered environment, multiple nodes perform inserts on tables, so the session-specific behavior is not retained for *@@identity*. In a clustered environment, the value for *@@identity* depends on the last record inserted in the node for the current session and not on the last record inserted in the cluster.

CHAPTER 4

Expressions, Identifiers, and Wildcard Characters

This chapter describes Transact-SQL expressions, valid identifiers, and wildcard characters.

Topics covered are:

Expressions

An expression is a combination of one or more constants, literals, functions, column identifiers and/or variables, separated by operators, that returns a single value. Expressions can be of several types, including **arithmetic**, **relational**, **logical** (or **Boolean**), and **character string**. In some Transact-SQL clauses, a subquery can be used in an expression. A case expression can be used in an expression.

Table 4-1 lists the types of expressions that are used in Adaptive Server syntax statements.

Table 4-1: Types of expressions used in syntax statements

Usage	Definition
expression	Can include constants, literals, functions, column identifiers, variables, or parameters
logical expression	An expression that returns TRUE, FALSE, or UNKNOWN
constant expression	An expression that always returns the same value, such as “5+3” or “ABCDE”
float_expr	Any floating-point expression or an expression that implicitly converts to a floating value
integer_expr	Any integer expression or an expression that implicitly converts to an integer value
numeric_expr	Any numeric expression that returns a single value
char_expr	Any expression that returns a single character-type value
binary_expression	An expression that returns a single binary or varbinary value

Size of expressions

Expressions returning binary or character datum can be up to 16384 bytes in length. However, earlier versions of Adaptive Server only allowed expressions to be up to 255 bytes in length. If you have upgraded from an earlier release of Adaptive Server, and your stored procedures or scripts store a result string of up to 255 bytes, the remainder will be truncated. You may have to re-write these stored procedures and scripts for to account for the additional length of the expressions.

Arithmetic and character expressions

The general pattern for arithmetic and character expressions is:

{*constant* | *column_name* | *function* | (*subquery*)
    | (*case_expression*)}
        [{*arithmetic_operator* | *bitwise_operator* |
        string_operator | *comparison_operator* }
    {*constant* | *column_name* | *function* | (*subquery*)
    | *case_expression*}]...

Relational and logical expressions

A logical expression or relational expression returns TRUE, FALSE, or UNKNOWN. The general patterns are:

expression *comparison_operator* [any | all] *expression*

expression [not] in *expression*

[not]exists *expression*

expression [not] between expression and *expression*

expression [not] like "*match_string*" [escape "*escape_character* "]

not expression like "*match_string*" [escape "*escape_character* "]

expression is [not] null

not *logical_expression*

logical_expression {and | or} *logical_expression*

Operator precedence

Operators have the following precedence levels, where 1 is the highest level and 6 is the lowest:

1. unary (single argument) – + ~
2. * / %
3. binary (two argument) + – & | ^
4. not
5. and
6. or

When all operators in an expression are at the same level, the order of execution is left to right. You can change the order of execution with parentheses—the most deeply nested expression is processed first.

Arithmetic operators

Adaptive Server uses the following arithmetic operators:

Table 4-2: Arithmetic operators

Operator	Meaning
+	Addition
–	Subtraction
*	Multiplication
/	Division
%	Modulo (Transact-SQL extension)

Addition, subtraction, division, and multiplication can be used on exact numeric, approximate numeric, and money type columns.

The modulo operator cannot be used on smallmoney or money columns. Modulo finds the integer remainder after a division involving two whole numbers. For example, 21 % 11 = 10 because 21 divided by 11 equals 1 with a remainder of 10.

In TSQL, the results of modulo has the same sign as the dividend. For example:

```
1> select -11 % 3, 11 % -3, -11 % -3
2> go
-------------- ----------- ----------- -----------
            -2           2          -2
```

```
(1 row affected)
```

When you perform arithmetic operations on mixed datatypes, for example float and int, Adaptive Server follows specific rules for determining the type of the result. For more information, see Chapter 1, “System and User-Defined Datatypes,”

Bitwise operators

The bitwise operators are a Transact-SQL extension for use with integer type data. These operators convert each integer operand into its binary representation, then evaluate the operands column by column. A value of 1 corresponds to true; a value of 0 corresponds to false.

Table 4-3 summarizes the results for operands of 0 and 1. If either operand is NULL, the bitwise operator returns NULL:

Table 4-3: Truth tables for bitwise operations

& (and)	1	0
1	1	0
0	0	0
| (or)	1	0
1	1	1
0	1	0
^ (exclusive or)	1	0
1	0	1
0	1	0
~ (not)		
1	FALSE	
0	0	

The examples in Table 4-4 use two tinyint arguments, A = 170 (10101010 in binary form) and B = 75 (01001011 in binary form).

Table 4-4: Examples of bitwise operations

Operation	Binary form	Result	Explanation
(A & B)	10101010 01001011 ------------ 00001010	10	Result column equals 1 if both A and B are 1. Otherwise, result column equals 0.
(A | B)	10101010 01001011 ------------ 11101011	235	Result column equals 1 if either A or B, or both, is 1. Otherwise, result column equals 0
(A ^ B)	10101010 01001011 ------------ 11100001	225	Result column equals 1 if either A or B, but not both, is 1
(~A)	10101010 ------------ 01010101	85	All 1s are changed to 0s and all 0s to 1s

String concatenation operator

You can use both the + and || (double-pipe) string operators to concatenate two or more character or binary expressions. For example, the following displays author names under the column heading Name in last-name first-name order, with a comma after the last name; for example, "Bennett, Abraham.":

```
select Name = (au_lname + ", " + au_fname)
    from authors
```

This example results in `"abcdef", "abcdef"`:

```
select "abc" + "def", "abc" || "def"
```

The following returns the string "abc def". The empty string is interpreted as a single space in all char, varchar, unichar, nchar, nvarchar, and text concatenation, and in varchar and univarchar insert and assignment statements:

```
select "abc" + "" + "def"
```

When concatenating non-character, non-binary expressions, always use convert:

```
select "The date is " +
    convert(varchar(12), getdate())
```

A string concatenated with NULL evaluates to the value of the string. This is an exception to the SQL standard, which states that a string concatenated with a NULL should evaluate to NULL.

Comparison operators

Adaptive Server uses the comparison operators listed in Table 4-5:

Table 4-5: Comparison operators

Operator	Meaning
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to
!=	(Transact-SQL extension) Not equal to
!>	(Transact-SQL extension) Not greater than
!<	(Transact-SQL extension) Not less than

In comparing character data, < means closer to the beginning of the server's sort order and > means closer to the end of the sort order. Uppercase and lowercase letters are equal in a case-insensitive sort order. Use sp_helpsort to see the sort order for your Adaptive Server. Trailing blanks are ignored for comparison purposes. So, for example, "Dirk" is the same as "Dirk ".

In comparing dates, < means earlier and > means later.

Put single or double quotes around all character and datetime data used with a comparison operator:

```
= "Bennet"
> "May 22 1947"
```

Nonstandard operators

The following operators are Transact-SQL extensions:

- Modulo operator: %
- Negative comparison operators: !>, !<, !=

- Bitwise operators: ~, ^, |, &
- Join operators: *= and =*

Using *any*, *all* and *in*

any is used with <, >, or = and a subquery. It returns results when any value retrieved in the subquery matches the value in the where or having clause of the outer statement. For more information, see the *Transact-SQL User's Guide*.

all is used with < or > and a subquery. It returns results when all values retrieved in the subquery are less than (<) or greater than (>) the value in the where or having clause of the outer statement. For more information, see the *Transact-SQL User's Guide*.

in returns results when any value returned by the second expression matches the value in the first expression. The second expression must be a subquery or a list of values enclosed in parentheses. in is equivalent to = any. For more information, see where clause in *Reference Manual: Commands*.

Negating and testing

not negates the meaning of a keyword or logical expression.

Use exists, followed by a subquery, to test for the existence of a particular result.

Ranges

between is the range-start keyword; and is the range-end keyword. The following range is inclusive:

```
where column1 between x and y
```

The following range is not inclusive:

```
where column1 > x and column1 < y
```

Using nulls in expressions

Use is null or is not null in queries on columns defined to allow null values.

An expression with a bitwise or arithmetic operator evaluates to NULL if any of the operands are null. For example, the following evaluates to NULL if *column1* is NULL:

```
1 + column1
```

Comparisons that return TRUE

In general, the result of comparing null values is UNKNOWN, since it is not possible to determine whether NULL is equal (or not equal) to a given value or to another NULL. However, the following cases return TRUE when *expression* is any column, variable or literal, or combination of these, which evaluates as NULL:

- *expression* is null
- *expression* = null
- *expression* = *@x*, where *@x* is a variable or parameter containing NULL. This exception facilitates writing stored procedures with null default parameters.
- *expression* != *n*, where *n* is a literal that does not contain NULL, and *expression* evaluates to NULL.

The negative versions of these expressions return TRUE when the expression does not evaluate to NULL:

- *expression* is not null
- *expression* != null
- *expression* != *@x*

Note The far right side of these exceptions is a literal null, or a variable or parameter containing NULL. If the far right side of the comparison is an expression (such as *@nullvar* + 1), the entire expression evaluates to NULL.

Following these rules, null column values do not join with other null column values. Comparing null column values to other null column values in a where clause always returns UNKNOWN for null values, regardless of the comparison operator, and the rows are not included in the results. For example, this query returns no result rows where column1 contains NULL in both tables (although it may return other rows):

```
select column1
from table1, table2
```

```
where table1.column1 = table2.column1
```

Difference between FALSE and UNKNOWN

Although neither FALSE nor UNKNOWN returns values, there is an important logical difference between FALSE and UNKNOWN, because the opposite of false (“not false”) is true. For example, “1 = 2” evaluates to false and its opposite, “1 != 2”, evaluates to true. But “not unknown” is still unknown. If null values are included in a comparison, you cannot negate the expression to get the opposite set of rows or the opposite truth value.

Using “NULL” as a character string

Only columns for which NULL was specified in the create table statement and into which you have explicitly entered NULL (no quotes), or into which no data has been entered, contain null values. Avoid entering the character string “NULL” (with quotes) as data for a character column. It can only lead to confusion. Use “N/A”, “none”, or a similar value instead. When you want to enter the value NULL explicitly, do *not* use single or double quotes.

NULL compared to the empty string

The empty string (“ ”or ‘ ’) is always stored as a single space in variables and column data. This concatenation statement is equivalent to “abc def”, not to “abcdef”:

```
"abc" + "" + "def"
```

The empty string is never evaluated as NULL.

Connecting expressions

and connects two expressions and returns results when both are true. or connects two or more conditions and returns results when either of the conditions is true.

When more than one logical operator is used in a statement, and is evaluated before or. You can change the order of execution with parentheses.

Table 4-6 shows the results of logical operations, including those that involve null values.

Table 4-6: Truth tables for logical expressions

and	TRUE	FALSE	NULL
TRUE	TRUE	FALSE	UNKNOWN
FALSE	FALSE	FALSE	FALSE
NULL	UNKNOWN	FALSE	UNKNOWN

or	TRUE	FALSE	NULL
TRUE	TRUE	TRUE	TRUE
FALSE	TRUE	FALSE	UNKNOWN
NULL	TRUE	UNKNOWN	UNKNOWN

not	
TRUE	FALSE
FALSE	TRUE
NULL	UNKNOWN

The result UNKNOWN indicates that one or more of the expressions evaluates to NULL, and that the result of the operation cannot be determined to be either TRUE or FALSE. See "Using nulls in expressions" on page 355 for more information.

Using parentheses in expressions

Parentheses can be used to group the elements in an expression. When "expression" is given as a variable in a syntax statement, a simple expression is assumed. "Logical expression" is specified when only a logical expression is acceptable.

Comparing character expressions

Character constant expressions are treated as varchar. If they are compared with non-varchar variables or column data, the datatype precedence rules are used in the comparison (that is, the datatype with lower precedence is converted to the datatype with higher precedence). If implicit datatype conversion is not supported, you must use the convert function.

Comparison of a char expression to a varchar expression follows the datatype precedence rule; the "lower" datatype is converted to the "higher" datatype. All varchar expressions are converted to char (that is, trailing blanks are appended) for the comparison. If a unichar expression is compared to a char (varchar, nchar, nvarchar) expression, the latter is implicitly converted to unichar.

Using the empty string

The empty string ("") or ('') is interpreted as a single blank in insert or assignment statements on varchar or univarchar data. In concatenation of varchar, char, nchar, nvarchar data, the empty string is interpreted as a single space; for following example is stored as "abc def":

```
"abc" + "" + "def"
```

The empty string is never evaluated as NULL.

Including quotation marks in character expressions

There are two ways to specify literal quotes within a char, or varchar entry. The first method is to double the quotes. For example, if you begin a character entry with a single quote and you want to include a single quote as part of the entry, use two single quotes:

```
'I don''t understand.'
```

With double quotes:

```
"He said, ""It's not really confusing."""
```

The second method is to enclose a quote in the opposite kind of quote mark. In other words, surround an entry containing a double quote with single quotes (or vice versa). Here are some examples:

```
'George said, "There must be a better way."'
"Isn't there a better way?"
'George asked, "Isn"t there a better way?"'
```

Using the continuation character

To continue a character string to the next line on your screen, enter a backslash (\) before going to the next line.

Identifiers

Identifiers are names for database objects such as databases, tables, views, columns, indexes, triggers, procedures, defaults, rules, and cursors.

The limit for the length of object names or identifiers is 255 bytes for regular identifiers, and 253 bytes for delimited identifiers. The limit applies to most user-defined identifiers including table name, column name, index name and so on. Due to the expanded limits, some system tables (catalogs) and built-in functions have been expanded.

For variables, “@” count as 1 byte, and the allowed name for it is 254 bytes long.

Listed below are the identifiers, system tables, and built-in functions that are affected these limits.

The maximum length for these identifiers is now 255 bytes.

- Table name
- Column name
- Index name
- View name
- User-defined datatype
- Trigger name
- Default name
- Rule name
- Constraint name
- Procedure name
- Variable name
- JAR name
- Name of LWP or dynamic statement
- Function name
- Name of the time range
- Application context name

Most user-defined Adaptive Server identifiers can be a maximum of 255 bytes in length, whether single-byte or multibyte characters are used. Others can be a mximum of 30 bytes. Refer to the *Transact-SQL User’s Guide* for a list of both 255-byte and 30-byte identifiers.

The first character of an identifier must be either an alphabetic character, as defined in the current character set, or the underscore (_) character.

Note Temporary table names, which begin with the pound sign (#), and variable names, which begin with the at sign (@), are exceptions to this rule.

Subsequent characters can include letters, numbers, the symbols #, @, _, and currency symbols such as $ (dollars), ¥ (yen), and £ (pound sterling). Identifiers cannot include special characters such as !, %, ^, &, *, and . or embedded spaces.

You cannot use a reserved word, such as a Transact-SQL command, as an identifier. For a complete list of reserved words, see Chapter 5, “Reserved Words.”

You cannot use the dash symbol (–) as an identifier.

Short identifiers

The maximum length for these identifiers is 30 bytes:

- Cursor name
- Server name
- Host name
- Login name
- Password
- Host process identification
- Application name
- Initial language name
- Character set name
- User name
- Group name
- Database name
- Logical device name
- Segment name

- Session name
- Execution class name
- Engine name
- Quiesce tag name
- Cache name

Tables beginning with # (temporary tables)

Tables with names that begin with the pound sign (#) are temporary tables. You cannot create other types of objects with names that begin with the pound sign.

Adaptive Server performs special operations on temporary table names to maintain unique naming on a per-session basis. When you create a temporary table with a name of fewer than 238 bytes, the sysobjects name in the tempdb adds 17 bytes to make the table name unique. If the table name is more than 238 bytes, the temporary table name in sysobjects uses only the first 238 bytes, then adds 17 bytes to make it unique.

In versions of Adaptive Server earlier than 15.0, temporary table names in sysobjects were 30 bytes. If you used a table name with fewer than 13 bytes, the name was padded with underscores (_) to 13 bytes, then another 17 bytes of other characters to bring the name up to 30 bytes.

Case sensitivity and identifiers

Sensitivity to the case (upper or lower) of identifiers and data depends on the sort order installed on your Adaptive Server. Case sensitivity can be changed for single-byte character sets by reconfiguring Adaptive Server's sort order; see the *System Administration Guide* for more information. Case is significant in utility program options.

If Adaptive Server is installed with a case-insensitive sort order, you cannot create a table named MYTABLE if a table named MyTable or mytable already exists. Similarly, the following command will return rows from MYTABLE, MyTable, or mytable, or any combination of uppercase and lowercase letters in the name:

```
select * from MYTABLE
```

Uniqueness of object names

Object names need not be unique in a database. However, column names and index names must be unique within a table, and other object names must be unique for each *owner* within a *database*. Database names must be unique on Adaptive Server.

Using delimited identifiers

Delimited identifiers are object names enclosed in double quotes. Using delimited identifiers allows you to avoid certain restrictions on object names. In earlier versions of Adaptive Server, only table, view, and column names could be delimited by quotes; other object names could not. This has changed beginning in Adaptive Server version 15.7, although enabling the ability requires setting a configuration parameter.

Delimited identifiers can be reserved words, can begin with non-alphabetic characters, and can include characters that would not otherwise be allowed. They cannot exceed 253 bytes.

Warning! Delimited identifiers may not be recognized by all front-end applications and should not be used as parameters to system procedures.

Before creating or referencing a delimited identifier, you must execute:

```
set quoted_identifier on
```

Each time you use the delimited identifier in a statement, you must enclose it in double quotes. For example:

```
create table "1one"(col1 char(3))
create table "include spaces" (col1 int)
create table "grant"("add" int)
insert "grant"("add") values (3)
```

While the quoted_identifier option is turned on, do not use double quotes around character or date strings; use single quotes instead. Delimiting these strings with double quotes causes Adaptive Server to treat them as identifiers. For example, to insert a character string into *col1* of *1table* , use:

```
insert "1one"(col1) values ('abc')
```

Do not use:

```
insert "1one"(col1) values ("abc")
```

To insert a single quote into a column, use two consecutive single quotation marks. For example, to insert the characters "a'b" into *col1* use:

```
insert "1one"(col1) values('a''b')
```

Syntax that includes quotes

When the quoted_identifier option is set to on, you do not need to use double quotes around an identifier if the syntax of the statement requires that a quoted string contain an identifier. For example:

```
set quoted_identifier on
create table '1one' (c1 int)
```

However, object_id() requires a string, so you must include the table name in quotes to select the information:

```
select object_id('1one')
-----------------------
  896003192
```

You can include an embedded double quote in a quoted identifier by doubling the quote:

```
create table "embedded""quote" (c1 int)
```

However, there is no need to double the quote when the statement syntax requires the object name to be expressed as a string:

```
select object_id('embedded"quote')
```

Enabling quoted identifiers

The quoted identifier enhancement configuration parameter allows Adaptive Server to use quoted identifiers for:

- Tables
- Views
- Column names
- Index names (Adaptive Server version 15.7 and later)
- System procedure parameters (Adaptive Server version 15.7 and later)

quoted identifier enhancement is part of the enable functionality group, and its default settings depends on the settings for enable functionality group configuration parameter. See the *System Administration Guide, Volume 1*. To enable quoted identifiers:

1 Set the enable functionality group or quoted identifier enhancement configuration parameter to 1. For example:

```
sp_configure "enable functionality group", 1
```

You must restart Adaptive Server for the change to take effect.

2 Turn on quoted_identifier for the current session:

```
set quoted_identifier on
```

Once you enable quoted identifier enhancement, the query processor removes delimiters and trailing spaces from object definitions when you include quoted identifiers. For example, Adaptive Server considers `"ident"`, `[ident]`, and `ident` to be identical. If quoted identifier enhancement is not enabled, `"ident"` is considered distinct from the other two.

When you start Adaptive Server with quoted identifier enhancement enabled:

- Objects you create with quoted identifiers before restarting Adaptive Server with the enable functionality group configuration parameter enabled are not automatically accessible when you use quoted identifiers after starting the server with this parameter enabled, and vice versa. That is, Adaptive Server does not automatically rename all database objects.

  However, you can use sp_rename to manually rename objects. For example, if you create an object named `"ident"` and then restart Adaptive Server with enable functionality group enabled, rename the object by issuing:

  ```
  sp_rename '"ident"', 'ident'
  ```

- Adaptive Server treats `[tab.dba.ident]` and `"tab.dba.ident"` as fully qualified names.
- Any Transact-SQL statements, functions, and system or stored procedures that accept identifiers for objects also work with delimited identifiers.
- The valid_name function distinguishes strings that are valid for identifiers under regular rules from those that are valid under the rules for delimited identifiers, with a nonzero return indicating a valid name.

  For example, `valid_name('ident/v1')` returns true (zero) since `'ident/v1'` is valid only as a delimited identifier. However, `valid_name('ident')` returns a nonzero value because `'ident'` is valid as a delimited identifier or as a normal identifier.

- Identifiers are limited to 253 characters (28 bytes) (without quoted identifier enhancement enabled these are 255 characters (30 bytes) long). Valid lengths for delimited identifiers include the delimiters and any embedded or trailing spaces.

> **Note** Sybase recommends that you avoid conventional identifiers that cannot be represented as delimited identifiers zones (254–255 or 29–30 bytes in length). Adaptive Server and its subsystems occasionally construct internal SQL statements with delimiters added to identifiers.

- Sybase recommends that you do not use dots and delimiters as part of identifiers because of how Adaptive Server interprets double quotes in varchar strings referring to identifiers.
- Identifiers have these additional constraints if they relate to items outside Adaptive Server:
    - Identifiers must begin with an alphabetic character followed by alphanumeric characters or several special characters ($, #, @, _, ¥, £). Additionally:
        - SQL variables can include @ as the first character.
        - Temporary objects (objects in tempdb) can include # as the first character.
    - You cannot use reserved words as identifiers. See Chapter 5, “Reserved Words.”
    - Delimited identifiers need not conform to the rules for conventional identifiers, but must be delimited with matching square brackets or with double quotes.
    - You cannot use delimited identifiers for variables or labels.
    - You must enable set quoted_identifier to use quoted identifiers. Once you enable set quoted_identifier, you must enclose varchar string literals in single, not double, quotes.
    - varchar string literals that contain identifiers cannot include delimiter characters.
    - Delimited identifiers cannot begin with the pound-sign (#). Sybase also recommends that they do not:
        - Begin with (@)
        - Include spaces

- Contain the dot character (.), or the delimiter characters: “, [, or]

- Trailing spaces are stripped from delimited identifiers, and zero-length identifiers are not allowed.

Identifying tables or columns by their qualified object name

You can uniquely identify a table or column by adding other names that qualify it—the database name, owner’s name, and (for a column) the table or view name. Each qualifier is separated from the next one by a period. For example:

```
database.owner.table_name.column_name
database.owner.view_name.column_name
```

The naming conventions are:

```
[[database.]owner.]table_name
[[database.]owner.]view_name
```

Using delimited identifiers within an object name

If you use set quoted_identifier on, you can use double quotes around individual parts of a qualified object name. Use a separate pair of quotes for each qualifier that requires quotes. For example, use:

```
database.owner."table_name"."column_name"
```

Do not use:

```
database.owner."table_name.column_name"
```

Omitting the owner name

You can omit the intermediate elements in a name and use dots to indicate their positions, as long as the system is given enough information to identify the object:

```
database..table_name

database..view_name
```

Referencing your own objects in the current database

You need not use the database name or owner name to reference your own objects in the current database. The default value for *owner* is the current user, and the default value for *database* is the current database.

If you reference an object without qualifying it with the database name and owner name, Adaptive Server tries to find the object in the current database among the objects you own.

Referencing objects owned by the database owner

If you omit the owner name and you do not own an object by that name, Adaptive Server looks for objects of that name owned by the Database Owner. You must qualify objects owned by the Database Owner only if you own an object of the same name, but you want to use the object owned by the Database Owner. However, you must qualify objects owned by other users with the user's name, whether or not you own objects of the same name.

Using qualified identifiers consistently

When qualifying a column name and table name in the same statement, be sure to use the same qualifying expressions for each; they are evaluated as strings and must match; otherwise, an error is returned. Example 2 is incorrect because the syntax style for the column name does not match the syntax style used for the table name.

Example 1

```
select demo.mary.publishers.city
from demo.mary.publishers

city
-----------------------
Boston
Washington
Berkeley
```

Example 2

```
select demo.mary.publishers.city
from demo..publishers

The column prefix "demo.mary.publishers" does not match a
table name or alias name used in the query.
```

Determining whether an identifier is valid

Use the system function valid_name, after changing character sets or before creating a table or view, to determine whether the object name is acceptable to Adaptive Server. Here is the syntax:

```
select valid_name("Object_name")
```

If *object_name* is not a valid identifier (for example, if it contains illegal characters or is more than 30 bytes long), Adaptive Server returns 0. If *object_name* is a valid identifier, Adaptive Server returns a nonzero number.

Renaming database objects

Rename user objects (including user-defined datatypes) with sp_rename.

Warning! After you rename a table or column, you must redefine all procedures, triggers, and views that depend on the renamed object.

Using multibyte character sets

In multibyte character sets, a wider range of characters is available for use in identifiers. For example, on a server with the Japanese language installed, the following types of characters may be used as the first character of an identifier: Zenkaku or Hankaku Katakana, Hiragana, Kanji, Romaji, Greek, Cyrillic, or ASCII.

Although Hankaku Katakana characters are legal in identifiers on Japanese systems, they are not recommended for use in heterogeneous systems. These characters cannot be converted between the EUC-JIS and Shift-JIS character sets.

The same is true for some 8-bit European characters. For example, the OE ligature, is part of the Macintosh character set (codepoint 0xCE). This character does not exist in the ISO 8859-1 (iso_1) character set. If the OE ligature exists in data being converted from the Macintosh to the ISO 8859-1 character set, it causes a conversion error.

If an object identifier contains a character that cannot be converted, the client loses direct access to that object.

like pattern matching

Adaptive Server allows you to treat square brackets individually in the like pattern-matching algorithm.

For example, matching a row with '[XX]' in earlier versions of Adaptive Server required you to use:

```
select * from t1 where f1 like '[[]XX[]]'
```

However, you can also use:

```
select * from t1 where f1 like '[[]XX]'
```

Because of the need for full compatibility, this feature is available only in Adaptive Server version 15.7 and later by enabling the command:

sp_configure "enable functionality group", 1

If you do not enable this feature, the behavior of like pattern-matching for square brackets is as in versions of Adaptive Server earlier than 15.7.

When you enable this feature:

- like pattern-matching allows a closing square bracket ("]") immediately following an opening bracket ("[") to stand for itself, so that the pattern "[]]" matches the string "]".
- An initial caret ("^") inverts the sense in all character ranges, so that the pattern "[^]]" should match any single character string that is not "]".
- In any other position, the closing bracket ("]") marks the end of the character range.

The patterns that work when you enable this feature are:

Pattern	Matches
"[[]"	"["
"[]]"	"]"
"]"	"]"
"[[]XX]"	"[XX]"
"[[]XX[]]"	"[XX]"

Using *not like*

Use not like to find strings that do not match a particular pattern. These two queries are equivalent: they find all the phone numbers in the authors table that do not begin with the 415 area code.

```
select phone
from authors
where phone not like "415%"
```

```
select phone
from authors
where not phone like "415%"
```

For example, this query finds the system tables in a database whose names begin with “sys”:

```
select name
from sysobjects
where name like "sys%"
```

To see all the objects that are *not* system tables, use:

```
not like "sys%"
```

If you have a total of 32 objects and like finds 13 names that match the pattern, not like will find the 19 objects that do not match the pattern.

not like and the negative wildcard character [^] may give different results (see “The caret (^) wildcard character” on page 374). You cannot always duplicate not like patterns with like and ^. This is because not like finds the items that do not match the entire like pattern, but like with negative wildcard characters is evaluated one character at a time.

A pattern such as like “[^s][^y][^s]%" may not produce the same results. Instead of 19, you might get only 14, with all the names that begin with “s”, *or* have “y” as the second letter, *or* have “s” as the third letter eliminated from the results, as well as the system table names. This is because match strings with negative wildcard characters are evaluated in steps, one character at a time. If the match fails at any point in the evaluation, it is eliminated.

Pattern matching with wildcard characters

Wildcard characters represent one or more characters, or a range of characters, in a *match_string*. A *match_string* is a character string containing the pattern to find in the expression. It can be any combination of constants, variables, and column names or a concatenated expression, such as:

```
like @variable + "%".
```

If the match string is a constant, it must always be enclosed in single or double quotes.

Use wildcard characters with the keyword like to find character and date strings that match a particular pattern. You cannot use like to search for seconds or milliseconds. For more information, see “Using wildcard characters with datetime data” on page 377.

Use wildcard characters in where and having clauses to find character or date/time information that is like—or not like—the match string:

{where | having} [not]
    expression [not] like *match_string*
        [escape "*escape_character* "]

expression can be any combination of column names, constants, or functions with a character value.

Wildcard characters used without like have no special meaning. For example, this query finds any phone numbers that start with the four characters “415%”:

```
select phone
from authors
where phone = "415%"
```

Case and accent insensitivity

If your Adaptive Server uses a case-insensitive sort order, case is ignored when comparing *expression* and *match_string*. For example, this clause would return “Smith,” “smith,” and “SMITH” on a case-insensitive Adaptive Server:

```
where col_name like "Sm%"
```

If your Adaptive Server is also accent-insensitive, it treats all accented characters as equal to each other and to their unaccented counterparts, both uppercase and lowercase. The sp_helpsort system procedure displays the characters that are treated as equivalent, displaying an “=” between them.

Using wildcard characters

You can use the match string with a number of wildcard characters, which are discussed in detail in the following sections. Table 4-7 summarizes the wildcard characters:

Table 4-7: Wildcard characters used with like

Symbol	Meaning
%	Any string of 0 or more characters
_	Any single character
[ ]	Any single character within the specified range ([a-f]) or set ([abcdef])
[^]	Any single character not within the specified range ([^a-f]) or set ([^abcdef])

Enclose the wildcard character and the match string in single or double quotes (like “[dD]eFr_nce”).

The percent sign (%) wildcard character

Use the % wildcard character to represent any string of zero or more characters. For example, to find all the phone numbers in the authors table that begin with the 415 area code:

```
select phone
from authors
where phone like "415%"
```

To find names that have the characters “en” in them (Bennet, Green, McBadden):

```
select au_lname
from authors
where au_lname like "%en%"
```

Trailing blanks following “%” in a like clause are truncated to a single trailing blank. For example, “%” followed by two spaces matches “X ”(one space); “X ” (two spaces); “X   ” (three spaces), or any number of trailing spaces.

The underscore (_) wildcard character

Use the underscore (_) wildcard character to represent any single character. For example, to find all six-letter names that end with “heryl” (for example, Cheryl):

```
select au_fname
from authors
where au_fname like "_heryl"
```

Bracketed ([ ]) characters

Use brackets to enclose a range of characters, such as [a-f], or a set of characters such as [a2Br]. When ranges are used, all values in the sort order between (and including) *rangespec1* and *rangespec2* are returned. For example, "[0-z" matches 0-9, A-Z and a-z (and several punctuation characters) in 7-bit ASCII.

To find names ending with "inger" and beginning with any single character between M and Z:

```
select au_lname
from authors
where au_lname like "[M-Z]inger"
```

To find both "DeFrance" and "deFrance":

```
select au_lname
from authors
where au_lname like "[dD]eFrance"
```

When using bracketed identifiers to create objects, such as with create table [*table_name*] or create dstabase [*dbname*], you must include at least one valid character.

All trailing spaces within bracketed identifiers are removed from the object name. For example, you achieve the same results executing the following create table commands:

- create table [tab1<space><space>]
- create table [tab1]
- create table [tab1<space><space><space>]
- create table tab1

This rule applies to all objects you can create using bracketed identifiers.

The caret (^) wildcard character

The caret is the negative wildcard character. Use it to find strings that do not match a particular pattern. For example, "[^a-f]" finds strings that are not in the range a-f and "[^a2bR]" finds strings that are not "a," "2," "b," or "R."

To find names beginning with "M" where the second letter is not "c":

```
select au_lname
from authors
where au_lname like "M[^c]%"
```

When ranges are used, all values in the sort order between (and including) *rangespec1* and *rangespec2* are returned. For example,
“[0-z]” matches 0-9, A-Z , a-z, and several punctuation characters in 7-bit ASCII.

Using multibyte wildcard characters

If the multibyte character set configured on your Adaptive Server defines equivalent double-byte characters for the wildcard characters _, %, - [,], and ^, you can substitute the equivalent character in the match string. The underscore equivalent represents either a single- or double-byte character in the match string.

Using wildcard characters as literal characters

To search for the occurrence of %, _, [,], or ^ within a string, you must use an escape character. When a wildcard character is used in conjunction with an escape character, Adaptive Server interprets the wildcard character literally, rather than using it to represent other characters.

Adaptive Server provides two types of escape characters:

- Square brackets, a Transact-SQL extension
- Any single character that immediately follows an escape clause, compliant with the SQL standards

Using square brackets ([ ]) as escape characters

Use square brackets as escape characters for the percent sign, the underscore, and the left bracket. The right bracket does not need an escape character; use it by itself. If you use the hyphen as a literal character, it must be the first character inside a set of square brackets.

Table 4-8 shows examples of square brackets used as escape characters with like.

Table 4-8: Using square brackets to search for wildcard characters

like predicate	Meaning
like "5%"	5 followed by any string of 0 or more characters
like "5[%]"	5%
like "_n"	an, in, on (and so on)
like "[_]n"	_n
like "[a-cdf]"	a, b, c, d, or f
like "[-acdf]"	-, a, c, d, or f
like "[[]"	[
like "]"	]
like "[[]ab]"	[]ab

Using the *escape* clause

Use the escape clause to specify an escape character. Any single character in the server's default character set can be used as an escape character. If you try to use more than one character as an escape character, Adaptive Server generates an exception.

Do not use existing wildcard characters as escape characters because:

- If you specify the underscore (_) or percent sign (%) as an escape character, it loses its special meaning within that like predicate and acts only as an escape character.
- If you specify the left or right bracket ([or]) as an escape character, the Transact-SQL meaning of the bracket is disabled within that like predicate.
- If you specify the hyphen (-) or caret (^) as an escape character, it loses its special meaning and acts only as an escape character.

An escape character retains its special meaning within square brackets, unlike wildcard characters such as the underscore, the percent sign, and the open bracket.

The escape character is valid only within its like predicate and has no effect on other like predicates contained in the same statement. The only characters that are valid following an escape character are the wildcard characters (_, %, [,], or [^]), and the escape character itself. The escape character affects only the character following it, and subsequent characters are not affected by it.

If the pattern contains two literal occurrences of the character that happens to be the escape character, the string must contain four consecutive escape characters. If the escape character does not divide the pattern into pieces of one or two characters, Adaptive Server returns an error message. Table 4-9 shows examples of escape clauses used with like.

Table 4-9: Using the escape clause

like predicate	Meaning
like "5@%" escape "@"	5%
like "*_n" escape "*"	_n
like "%80@%%" escape "@"	String containing 80%
like "*_sql**%" escape "*"	String containing _sql*
like "%#####_#%%" escape "#"	String containing ##_%

Using wildcard characters with *datetime* data

When you use like with datetime values, Adaptive Server converts the dates to the standard datetime format, then to varchar. Since the standard storage format does not include seconds or milliseconds, you cannot search for seconds or milliseconds with like and a pattern.

It is a good idea to use like when you search for datetime values, since datetime entries may contain a variety of date parts. For example, if you insert the value "9:20" and the current date into a column named arrival_time, the clause:

```
where arrival_time = '9:20'
```

would not find the value, because Adaptive Server converts the entry into "Jan 1 1900 9:20AM." However, the following clause would find this value:

```
where arrival_time like '%9:20%'
```

CHAPTER 5 # Reserved Words

Keywords, also known as reserved words, are words that have special meanings. This chapter lists Transact-SQL and ANSI SQL keywords.

Topics covered are:

Transact-SQL reserved words

The words in Table 5-1 are reserved by Adaptive Server as keywords (part of SQL command syntax). They cannot be used as names of database objects such as databases, tables, rules, or defaults. They can be used as names of local variables and as stored procedure parameter names.

To find the names of existing objects that are reserved words, use sp_checkreswords in *Reference Manual: Procedures*.

Table 5-1: List of Transact-SQL reserved words

	Words
A	add, all, alter, and, any, arith_overflow, as, asc, at, authorization, avg
B	begin, between, break, browse, bulk, by
C	cascade, case, char_convert, check, checkpoint, close, clustered, coalesce, commit, compressed, compute, confirm, connect, constraint, continue, controlrow, convert, count, count_big, create, current, cursor
D	database, dbcc, deallocate, declare, decrypt, default, delete, desc, deterministic, disk, distinct, drop, dual_control, dummy, dump
E	else, encrypt, end, endtran, errlvl, errordata, errorexit, escape, except, exclusive, exec, execute, exists, exit, exp_row_size, external
F	fetch, fillfactor, for, foreign, from
G	goto, grant, group
H	having, holdlock

	Words
I	identity, identity_gap, identity_start, if, in, index, inout, insensitive, insert, install, intersect, into, is, isolation
J	jar, join
K	key, kill
L	level, like, lineno, load, lob_compression, lock
M	materialized, max, max_rows_per_page, min, mirror, mirrorexit, modify
N	national, new, noholdlock, nonclustered, not, null, nullif, numeric_truncation Note Although "new" is not a Transact-SQL reserved word, since it may become a reserved word in the future, Sybase recommends that you avoid using it (for example, to name a database object). "New" is a special case (see "Potential ANSI SQL reserved words" on page 381 for information on other reserved words) because it appears in the spt_values table, and because sp_checkreswords displays "New" as a reserved word.
O	of, off, offsets, on, once, online, only, open, option, or, order, out, output, over
P	partition, perm, permanent, plan, prepare, primary, print, privileges, proc, procedure, processexit, proxy_table, public
Q	quiesce
R	raiserror, read, readpast, readtext, reconfigure, references, release_locks_on_close, remove, reorg, replace, replication, reservepagegap, return, returns, revoke, role, rollback, rowcount, rows, rule
S	save, schema, scroll, select, semi_sensitive, set, setuser, shared, shutdown, some, statistics, stringsize, stripe, sum, syb_identity, syb_restree, syb_terminate
T	table, temp, temporary, textsize, to, tracefile, tran, transaction, trigger, truncate, tsequal
U	union, unique, unpartition, update, use, user, user_option, using
V	values, varying, view
W	waitfor, when, where, while, with, work, writetext
X	xmlextract, xmlparse, xmltest

ANSI SQL reserved words

Adaptive Server includes entry-level ANSI SQL features. Full ANSI SQL implementation includes the words listed in the following tables as command syntax. Upgrading identifiers can be a complex process; therefore, we are providing this list for your convenience. The publication of this information does not commit Sybase to providing all of these ANSI SQL features in subsequent releases. In addition, subsequent releases may include keywords not included in this list.

The words in Table 5-2 are ANSI SQL keywords that are not reserved words in Transact-SQL.

Table 5-2: List of ANSI SQL reserved words

	Words
A	absolute, action, allocate, are, assertion
B	bit, bit_length, both
C	cascaded, case, cast, catalog, char, char_length, character, character_length, coalesce, collate, collation, column, connection, constraints, corresponding, cross, current_date, current_time, current_timestamp, current_user
D	date, day, dec, decimal, deferrable, deferred, describe, descriptor, diagnostics, disconnect, domain
E	end-exec, exception, extract
F	false, first, float, found, full
G	get, global, go
H	hour
I	immediate, indicator, initially, inner, input, insensitive, int, integer, interval
J	join
L	language, last, leading, left, local, lower
M	match, minute, module, month
N	names, natural, nchar, next, no, nullif, numeric
O	octet_length, outer, output, overlaps
P	pad, partial, position, preserve, prior
R	real, relative, restrict, right
S	scroll, second, section, semi_sensitive, session_user , size , smallint, space, sql, sqlcode, sqlerror, sqlstate, substring, system_user
T	then, time, timestamp, timezone_hour, timezone_minute, trailing, translate, translation, trim, true
U	unknown, upper, usage
V	value, varchar
W	when, whenever, write, year
Z	zone

Potential ANSI SQL reserved words

If you are using the ISO/IEC 9075:1989 standard, also avoid using the words shown in the following list because these words may become ANSI SQL reserved words in the future.

Table 5-3: List of potential ANSI SQL reserved words

	Words
A	after, alias, async
B	before, boolean, breadth
C	call, completion, cycle
D	data, depth, dictionary
E	each, elseif, equals
G	general
I	ignore
L	leave, less, limit, loop
M	modify
N	new, none
O	object, oid, old, operation, operators, others
P	parameters, pendant, preorder, private, protected
R	recursive, ref, referencing, resignal, return, returns, routine, row
S	savepoint, search, sensitive, sequence, signal, similar, sqlexception, structure
T	test, there, type
U	under
V	variable, virtual, visible
W	wait, without

CHAPTER 6

SQLSTATE Codes and Messages

This chapter describes Adaptive Server's SQLSTATE status codes and their associated messages.

Topics covered are:

SQLSTATE codes are required for entry level ANSI SQL compliance. They provide diagnostic information about two types of conditions:

- *Warnings* – conditions that require user notification but are not serious enough to prevent a SQL statement from executing successfully
- *Exceptions* – conditions that prevent a SQL statement from having any effect on the database

Each SQLSTATE code consists of a 2-character class followed by a 3-character subclass. The class specifies general information about error type. The subclass specifies more specific information.

SQLSTATE codes are stored in the sysmessages system table, along with the messages that display when these conditions are detected. Not all Adaptive Server error conditions are associated with a SQLSTATE code—only those mandated by ANSI SQL. In some cases, multiple Adaptive Server error conditions are associated with a single SQLSTATE value.

Warnings

Adaptive Server currently detects the following SQLSTATE warning conditions, described in Table 6-1:

Table 6-1: SQLSTATE warnings

Message	Value	Description
Warning – null value eliminated in set function.	01003	Occurs when you use an aggregate function (avg, max, min, sum, or count) on an expression with a null value.
Warning–string data, right truncation	01004	Occurs when character, unichar, or binary data is truncated to 255 bytes. The data may be: • The result of a select statement in which the client does not support the WIDE TABLES property. • Parameters to an RPC on remote Adaptive Servers or Open Servers that do not support the WIDE TABLES property.

Exceptions

Adaptive Server detects the following types of exceptions:

- Cardinality violations
- Data exceptions
- Integrity constraint violations
- Invalid cursor states
- Syntax errors and access rule violations
- Transaction rollbacks
- with check option violations

Exception conditions are described in Table 6-2 through Table 6-8. Each class of exceptions appears in its own table. Within each table, conditions are sorted alphabetically by message text.

Cardinality violations

Cardinality violations occur when a query that should return only a single row returns more than one row to an Embedded SQL™ application.

Table 6-2: Cardinality violations

Message	Value	Description
Subquery returned more than 1 value. This is illegal when the subquery follows =, !=, <, <=, >, >=. or when the subquery is used as an expression.	21000	Occurs when: • A scalar subquery or a row subquery returns more than one row. • A select into parameter_list query in Embedded SQL returns more than one row.

Data exceptions

Data exceptions occur when an entry:

- Is too long for its datatype,
- Contains an illegal escape sequence, or
- Contains other format errors.

Table 6-3: Data exceptions

Message	Value	Description
Arithmetic overflow occurred.	22003	Occurs when: • An exact numeric type would lose precision or scale as a result of an arithmetic operation or sum function. • An approximate numeric type would lose precision or scale as a result of truncation, rounding, or a sum function.
Data exception - string data right truncated.	22001	Occurs when a char, unichar, univarchar, or varchar column is too short for the data being inserted or updated and non-blank characters must be truncated.
Divide by zero occurred.	22012	Occurs when a numeric expression is being evaluated and the value of the divisor is zero.
Illegal escape character found. There are fewer bytes than necessary to form a valid character.	22019	Occurs when you are searching for strings that match a given pattern if the escape sequence does not consist of a single character.
Invalid pattern string. The character following the escape character must be percent sign, underscore, left square bracket, right square bracket, or the escape character.	22025	Occurs when you are searching for strings that match a particular pattern when: • The escape character is not immediately followed by a percent sign, an underscore, or the escape character itself, or • The escape character partitions the pattern into substrings whose lengths are other than 1 or 2 characters.

Integrity constraint violations

Integrity constraint violations occur when an insert, update, or delete statement violates a primary key, foreign key, check, or unique constraint or a unique index.

Table 6-4: Integrity constraint violations

Message	Value	Description
`Attempt to insert duplicate key row in object` *`object_name`* `with unique index` *`index_name`*`.`	23000	Occurs when a duplicate row is inserted into a table that has a unique constraint or index.
`Check constraint violation occurred, dbname =` *`database_name`*`, table name =` *`table_name`*`, constraint name =` *`constraint_name`*`.`	23000	Occurs when an update or delete would violate a check constraint on a column.
`Dependent foreign key constraint violation in a referential integrity constraint. dbname =` *`database_name`*`, table name =` *`table_name`*`, constraint name =` *`constraint_name`*`.`	23000	Occurs when an update or delete on a primary key table would violate a foreign key constraint.
`Foreign key constraint violation occurred, dbname =` *`database_name`*`, table name =` *`table_name`*`, constraint name =` *`constraint_name`*`.`	23000	Occurs when an insert or update on a foreign key table is performed without a matching value in the primary key table.

Invalid cursor states

Invalid cursor states occur when:

- A fetch uses a cursor that is not currently open, or
- An update where current of or delete where current of affects a cursor row that has been modified or deleted, or
- An update where current of or delete where current of affects a cursor row that not been fetched.

Table 6-5: Invalid cursor states

Message	Value	Description
`Attempt to use cursor` *`cursor_name`* `which is not open. Use the system stored procedure sp_cursorinfo for more information.`	24000	Occurs when an attempt is made to fetch from a cursor that has never been opened or that was closed by a commit statement or an implicit or explicit rollback. Reopen the cursor and repeat the fetch.

Message	Value	Description
Cursor *cursor_name* was closed implicitly because the current cursor position was deleted due to an update or a delete. The cursor scan position could not be recovered. This happens for cursors which reference more than one table.	24000	Occurs when the join column of a multitable cursor has been deleted or changed. Issue another fetch to reposition the cursor.
The cursor *cursor_name* had its current scan position deleted because of a DELETE/UPDATE WHERE CURRENT OF or a regular searched DELETE/UPDATE. You must do a new FETCH before doing an UPDATE or DELETE WHERE CURRENT OF.	24000	Occurs when a user issues an update/delete where current of whose current cursor position has been deleted or changed. Issue another fetch before retrying the update/delete where current of.
The UPDATE/DELETE WHERE CURRENT OF failed for the cursor *cursor_name* because it is not positioned on a row.	24000	Occurs when a user issues an update/delete where current of on a cursor that: • Has not yet fetched a row • Has fetched one or more rows after reaching the end of the result set

Syntax errors and access rule violations

Syntax errors are generated by SQL statements that contain unterminated comments, implicit datatype conversions not supported by Adaptive Server or other incorrect syntax.

Access rule violations are generated when a user tries to access an object that does not exist or one for which he or she does not have the correct permissions.

Table 6-6: Syntax errors and access rule violations

Message	Value	Description
command permission denied on object *object_name*, database *database_name*, owner *owner_name*.	42000	Occurs when a user tries to access an object for which he or she does not have the proper permissions.
Implicit conversion from datatype '*datatype*' to '*datatype*' is not allowed. Use the CONVERT function to run this query.	42000	Occurs when the user attempts to convert one datatype to another but Adaptive Server cannot do the conversion implicitly.
Incorrect syntax near *object_name*.	42000	Occurs when incorrect SQL syntax is found near the object specified.

Message	Value	Description
`Insert error: column name or number of supplied values does not match table definition.`	42000	Occurs during inserts when an invalid column name is used or when an incorrect number of values is inserted.
`Missing end comment mark '*/'.`	42000	Occurs when a comment that begins with the /* opening delimiter does not also have the */ closing delimiter.
object_name `not found. Specify owner.objectname or use sp_help to check whether the object exists (sp_help may produce lots of output).`	42000	Occurs when a user tries to reference an object that he or she does not own. When referencing an object owned by another user, be sure to qualify the object name with the the name of its owner.
`The size (`*size*`) given to the` *object_name* `exceeds the maximum. The largest size allowed is` *size*`.`	42000	Occurs when: • The total size of all the columns in a table definition exceeds the maximum allowed row size. • The size of a single column or parameter exceeds the maximum allowed for its datatype.

Transaction rollbacks

Transaction rollbacks occur when the transaction isolation level is set to 3, but Adaptive Server cannot guarantee that concurrent transactions can be serialized. This type of exception generally results from system problems such as disk crashes and offline disks.

Table 6-7: Transaction rollbacks

Message	Value	Description
`Your server command (process id #`*process_id*` ) was deadlocked with another process and has been chosen as deadlock victim. Re-run your command.`	40001	Occurs when Adaptive Server detects that it cannot guarantee that two or more concurrent transactions can be serialized.

with check option violation

This class of exception occurs when data being inserted or updated through a view would not be visible through the view.

Table 6-8: with check option violation

Message	Value	Description
`The attempted insert or update failed because the target view was either created WITH CHECK OPTION or spans another view created WITH CHECK OPTION. At least one resultant row from the command would not qualify under the CHECK OPTION constraint.`	44000	Occurs when a view, or any view on which it depends, was created with a with check option clause.

Index

Symbols

Numerics

A

B

C

D

J

K

L

N

Q

R

S

T

U

V

W

X

Y

Z