



Common Libraries Reference Manual

**Open Client™ and Open Server™**

15.7

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# About This Book

This book contains reference information regarding:

- The C version of CS-Library, which contains utility routines that are useful to both Open Client™ Client-Library™ and Open Server™ Server-Library applications.
- The C version of Bulk-Library, which provides bulk copy routines for Client-Library and Server-Library applications. Bulk copy allows high-speed transfer of data between a database table and program variables.

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**Note** In previous Open Client and Open Server releases, Bulk-Library was referred to as “the Bulk Copy routines.”

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## Audience

This manual is designed to serve as a reference manual for programmers who are writing Client-Library or Open Server applications. It is written for application programmers who are familiar with the C programming language.

## How to use this book

This book contains these chapters:

- Chapter 1, “Introducing CS-Library,” contains a brief introduction to CS-Library.
- Chapter 2, “CS-Library Routines,” contains specific information about each CS-Library routine, such as what parameters the routine takes and what it returns.
- Chapter 3, “Bulk-Library,” contains a brief introduction to Bulk-Library.
- Chapter 4, “Bulk-Library Routines,” contains specific information on each Bulk-Library routine.

## Related documents

You can see these books for more information:

- The *Open Server and SDK New Features for Windows, Linux, and UNIX*, which describes new features available for Open Server and the Software Developer’s Kit. This document is revised to include new features as they become available.

- 
- The *Open Server Release Bulletin* for your platform contains important last-minute information about Open Server.
  - The *Software Developer's Kit Release Bulletin* for your platform contains important last-minute information about Open Client™ and SDK.
  - The *jConnect™ for JDBC™ Release Bulletin* contains important last-minute information about jConnect.
  - The *Open Client and Open Server Configuration Guide* for your platform contains information about configuring your system to run Open Client and Open Server.
  - The *Open Client Client-Library/C Programmers Guide* contains information on how to design and implement Client-Library applications.
  - The *Open Client Client-Library/C Reference Manual* contains reference information for Open Client Client-Library™.
  - The *Open Server Server-Library/C Reference Manual* contains reference information for Open Server Server-Library.
  - The *Open Server DB-Library/C Reference Manual* contains reference information for the C version of Open Client DB-Library™.
  - The *Open Client and Open Server Programmers Supplement* for your platform contains platform-specific information for programmers using Open Client and Open Server. This document includes information about:
    - Compiling and linking an application
    - The sample programs that are included with Open Client and Open Server
    - Routines that have platform-specific behaviors
  - The *Installation and Release Bulletin Sybase® SDK DB-Library Kerberos Authentication Option* contains information about installing and enabling the MIT Kerberos security mechanism to be used on DB-Library. DB-Library only supports network authentication and mutual authentication in the Kerberos security mechanism.
  - The *Open Client Client-Library Migration Guide* contains information on how to migrate Open Client™ DB-Library™ applications to Open Client Client-Library
  - The *Open Client and Open Server International Developers Guide* provides information about creating internationalized and localized applications.



- The *Open Client Embedded SQL™/C Programmers Guide* explains how to use Embedded SQL and the Embedded SQL precompiler with C applications.
- The *Open Client Embedded SQL™/COBOL Programmers Guide* explains how to use Embedded SQL and the Embedded SQL precompiler with COBOL applications.
- The *jConnect for JDBC Programmers Reference* describes the jConnect for JDBC product and explains how to access data stored in relational database management systems.
- The *Adaptive Server® Enterprise ADO.NET Data Provider Users Guide* provides information on how to access data in Adaptive Server using any language supported by .NET, such as C#, Visual Basic .NET, C++ with managed extension, and J#.
- The *Adaptive Server Enterprise ODBC Driver by Sybase Users Guide* for Microsoft Windows and UNIX, provides information on how to access data from Adaptive Server on Microsoft Windows and UNIX platforms, using the Open Database Connectivity (ODBC) Driver.
- The *Adaptive Server Enterprise OLE DB Provider by Sybase Users Guide for Microsoft Windows* provides information on how to access data from Adaptive Server on Microsoft Windows platforms, using the Adaptive Server OLE DB Provider.
- The *Adaptive Server Enterprise Database Driver for Perl Programmers Guide* provides information for Perl developers to connect to an Adaptive Server database and query or change information using a Perl script.
- The *Adaptive Server Enterprise extension module for PHP Programmers Guide* provides information for PHP developers to execute queries against an Adaptive Server database.
- The *Adaptive Server Enterprise extension module for Python Programmers Guide* provides information about Sybase-specific Python interface that can be used to execute queries against an Adaptive Server database.

**Other sources of information**

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- 1 Point your Web browser to Technical Documents at <http://www.sybase.com/support/techdocs/>.
- 2 Click Partner Certification Report.
- 3 In the Partner Certification Report filter select a product, platform, and timeframe and then click Go.
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- 1 Point your Web browser to Availability and Certification Reports at <http://certification.sybase.com/>.
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- 4 Specify a time frame and click Go. A list of EBF/Maintenance releases is displayed.

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- 5 Click the Info icon to display the EBF/Maintenance report, or click the product description to download the software.

## Conventions

**Table 1: Syntax conventions**

Key	Definition
command	Command names, command option names, utility names, utility flags, and other keywords are in sans serif font.
<i>variable</i>	Variables, or words that stand for values that you fill in, are in <i>italics</i> .
{ }	Curly braces indicate that you choose at least one of the enclosed options. Do not include the braces in the command.
[ ]	Brackets mean choosing one or more of the enclosed items is optional. Do not include the braces in the command.
( )	Parentheses are to be typed as part of the command.
	The vertical bar means you can select only one of the options shown.
,	The comma means you can choose as many of the options shown as you like, separating your choices with commas to be typed as part of the command.

## Accessibility features

This document is available in an HTML version that is specialized for accessibility. You can navigate the HTML with an adaptive technology such as a screen reader, or view it with a screen enlarger.

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Open Client and Open Server documentation has been tested for compliance with U.S. government Section 508 Accessibility requirements. Documents that comply with Section 508 generally also meet non-U.S. accessibility guidelines, such as the World Wide Web Consortium (W3C) guidelines for Web sites.

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**Note** You might need to configure your accessibility tool for optimal use. Some screen readers pronounce text based on its case; for example, they pronounce ALL UPPERCASE TEXT as initials, and MixedCase Text as words. You might find it helpful to configure your tool to announce syntax conventions. Consult the documentation for your tool.

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# Introducing CS-Library

This chapter gives an overview of CS-Library. It covers the following topics:

<b>Topic</b>	<b>Page</b>
CS-Library overview	1
Using CS-Library	2
Structures	3
Datatypes, constants, and conventions	4
Error handling	4

## CS-Library overview

CS-Library provides utility routines for use in application program development to support:

- Datatype conversion
- Arithmetic operations
- Character-set conversion
- Datetime operations
- Sort-order operations
- Localized error messages

CS-Library also includes routines to allocate and deallocate CS-Library structures.

Although you can write a standalone CS-Library application, CS-Library's primary function is to provide common utility routines to Client-Library and Server-Library applications.

Because Client-Library and Server-Library programs require a context structure, which can only be allocated using CS-Library, all Client-Library and Server-Library programs include at least two calls to CS-Library—one to allocate a `CS_CONTEXT` and one to deallocate it.

A context structure contains information about an application's runtime environment, or "context." See "Structures" on page 3.

## Using CS-Library

You can call CS-Library routines either from within a Client-Library or Server-Library application, or from within a standalone CS-Library application.

### Open Client and Open Server applications

Typically, CS-Library routines are called from within a Client-Library or Server-Library application.

Because the Client-Library and Server-Library header files *ctpublic.h* and *ospublic.h* include the CS-Library header file *cspublic.h*, Client-Library and Server-Library applications do not need an additional header file to make CS-Library calls.

After calling `cs_ctx_alloc` to allocate a `CS_CONTEXT`, a Client-Library or Server-Library application is free to call any other CS-Library routine.

### A standalone CS-Library application

It is possible to write a standalone CS-Library application, although this is not a typical use of CS-Library. For example, a standalone application might make CS-Library calls to use the Open Client and Open Server datatypes and datatype conversion routines.

This type of application needs to include the standard CS-Library header file, *cspublic.h*.

The *Open Client and Open Server Programmers Supplement* includes compiling and linking instructions for CS-Library on your platform.

## Structures

CS-Library makes use of several structures, including the CS\_CONTEXT control structure, the CS\_DATAFMT data format structure, and the CS\_LOCALE locale information structure.

The CS\_CONTEXT structure is a hidden structure whose internals are not available to an application. The CS\_CONTEXT is discussed briefly in the following section.

The CS\_CONTEXT structure is also required for Client-Library and Server-Library applications.

- For more information about how Client-Library uses the CS\_CONTEXT structure, see the *Open Client Client-Library/C Reference Manual* or the *Open Client Client-Library/C Programmers Guide*.
- For more information about how Server-Library uses the CS\_CONTEXT structure, see the *Open Server Server-Library/C Reference Manual*.

The CS\_DATAFMT and CS\_LOCALE structures are documented in Chapter 2, “Topics,” in the *Open Client Client-Library/C Reference Manual*.

### CS\_CONTEXT structure

CS-Library defines a single control structure, CS\_CONTEXT.

A CS\_CONTEXT structure stores configuration information that describes a particular programming context. An application must allocate a CS\_CONTEXT structure before calling any other Client-Library, Server-Library, or CS-Library routine.

An application allocates a CS\_CONTEXT structure by calling `cs_ctx_alloc` or `cs_ctx_global`.

An application can customize a CS\_CONTEXT by changing the values of context properties. The following routines change the values of context properties:

- The CS-Library routine `cs_config` (after the context has been allocated)
- The Client-Library routine `ct_config` (after the Client-Library routine `ct_init` has been called for the context)
- The Server-Library routine `srv_props` (after calling the Server-Library routine `srv_version` for the context)

An application should deallocate all existing context structures before exiting. An application deallocates a CS\_CONTEXT structure by calling `cs_ctx_drop`.

## **Datatypes, constants, and conventions**

CS-Library uses the same datatypes, constants, and conventions as Client-Library and Server-Library and can be found in the following documents:

- The “Using Open Client and Open Server Datatypes” chapter in the *Open Client Client-Library/C Programmers Guide*
- The “Types” section in the *Open Client Client-Library/C Reference Manual*
- The “Types” section in the *Open Server Server-Library/C Reference Manual*

## **Error handling**

All CS-Library routines return success or failure indications. Sybase strongly recommends that applications check these return codes.

In addition, CS-Library routines can generate CS-Library messages, which range in severity from informational messages to fatal errors. Applications should take steps to receive and handle these messages. In most cases, when a CS-Library routine fails, CS-Library generates a message that describes the reason for the failure.

## **Two methods of handling messages**

An application can handle CS-Library messages in one of two ways:

- By installing a callback routine to handle messages
- Inline, using the CS-Library routine `cs_diag`

The callback method has the following advantages:

- Gracefully handles unexpected errors



CS-Library automatically calls the appropriate message callback routine whenever a message is generated, so an application can trap unexpected errors. An application using only inline error-handling logic may not successfully trap errors that have not been anticipated.

- Centralizes message-handling code

Since all errors are handled in the callback, there is no need to add inline message-handling code after each CS-Library call.

Inline message handling has the advantage of allowing an application to check for messages at particular times. For example, an application that makes a sequence of calls to establish a connection might wait until the connection-related call sequence is complete before checking for messages.

Most applications use the callback method to handle messages.

An application indicates which method it will use for a particular context either by calling `cs_config` to install a message callback routine or by calling `cs_diag` to initialize inline message handling.

An application can switch back and forth between the inline method and the callback method:

- Installing a message callback routine turns off inline message handling. Any saved messages are discarded.
- Likewise, calling `cs_diag` to initialize inline message handling “de-installs” the application’s CS-Library message callback. As a result, the application’s first `CS_GET` call to `cs_diag` will retrieve a warning message to this effect.

If a message callback is not installed and inline message handling is not enabled, CS-Library discards message information.

## Using a callback to handle messages

To handle CS-Library errors with a callback function, your application must:

- Declare the callback function as described in “Defining a CS-Library message callback” on page 6.
- Install the callback error handler by calling `cs_config` to set the `CS_MESSAGE_CB` property. For a detailed description, see “CS-Library Message Callback property” on page 19.

## Defining a CS-Library message callback

A CS-Library message callback is defined as follows:

```
CS_RETCODE CS_PUBLIC cslibmsg_cb(context, message)
CS_CONTEXT *context;
CS_CLIENTMSG *message;
```

where:

- *context* is a pointer to the CS\_CONTEXT structure for which the message occurred.
- *message* is a pointer to a CS\_CLIENTMSG structure containing message information. For information on the CS\_CLIENTMSG structure, see the “CS\_CLIENTMSG Structure” topics page in the *Open Client Client-Library/C Reference Manual*. Note the following similarities with Client-Library:
  - Error severities for CS-Library errors have the same meaning as for Client-Library errors.
  - The *message->msgnumber* field is a bit-packed CS\_INT. This number is unpacked with the macros CS\_LAYER, CS\_ORIGIN, CS\_NUMBER, and CS\_SEVERITY. This method is the same for Client-Library messages.

Note that *message* can have a new value each time the message callback is called.

A CS-Library message callback must return either:

- CS\_SUCCEED, to instruct CS-Library to continue any processing that is currently occurring on this context, or
- CS\_FAIL, to instruct CS-Library to terminate any processing that is currently occurring on this context.

## CS-Library message callback example

```
/*
** cslib_err_handler() - CS-Library error handler.
**
** This routine is the CS-Library error handler used by this
** application. It is called by CS-Library whenever an error
** occurs. Here, we simply print the error and return.
**
** Parameters:
** context
```

```

**      A pointer to the context handle for context
**      on which the error occurred.
**      error_msg
**      The structure containing information about the
**      error.
**
** Returns:
**      CS_SUCCEEDED
*/
CS_RETCODE CS_PUBLIC cslib_err_handler(context, errmsg)
CS_CONTEXT *context;
CS_CLIENTMSG *errmsg;
{
    /*
    ** Print the error details.
    */
    fprintf(stdout, "CS-Library error: ");
    fprintf(stdout, "LAYER = (%ld) ORIGIN = (%ld) ",
            CS_LAYER(errmsg->msgnumber),
            CS_ORIGIN(errmsg->msgnumber) );
    fprintf(stdout, "SEVERITY = (%ld) NUMBER = (%ld)\n",
            CS_SEVERITY(errmsg->msgnumber),
            CS_NUMBER(errmsg->msgnumber) );
    fprintf(stdout, "\t%s\n", errmsg->msgstring);
    /*
    ** Print any operating system error information.
    */
    if( errmsg->osstringlen > 0 )
    {
        fprintf(stdout, "CS-Library OS error %ld - %s.\n",
                errmsg->osnumber, errmsg->osstring);
    }
    /*
    ** All done.
    */
    return (CS_SUCCEEDED);
}

```

## Inline message handling

An application calls `cs_diag` to initialize inline CS-Library message handling for a context.

An application that is retrieving messages into `SQLCA`, `SQLCODE`, or `SQLSTATE` must set the CS-Library property `CS_EXTRA_INF` to `CS_TRUE`.

For information on the inline method of handling CS-Library messages, see the reference page for `cs_diag` in Chapter 2, “CS-Library Routines.”

# CS-Library Routines

This chapter contains a reference page for each CS-Library routine.

<b>Routines</b>	<b>Description</b>	<b>Page</b>
cs_calc	Performs an arithmetic operation on two operands.	10
cs_cmp	Compares two data values.	12
cs_config	Sets or retrieves CS-Library properties.	13
cs_conv_mult	Retrieves the conversion multiplier for converting character data from one character set to another.	23
cs_convert	Converts a data value from one datatype, locale, or format to another datatype, locale, or format.	25
cs_ctx_alloc	Allocates a CS_CONTEXT structure.	37
cs_ctx_drop	Deallocates a CS_CONTEXT structure.	42
cs_ctx_global	Allocates or returns a CS_CONTEXT structure.	43
cs_diag	Manages inline error handling.	46
cs_dt_crack	Converts a machine-readable datetime value into a user-accessible format.	51
cs_dt_info	Sets or retrieves language-specific datetime information.	54
cs_loc_alloc	Allocates a CS_LOCALE structure.	62
cs_loc_drop	Deallocates a CS_LOCALE structure.	63
cs_locale	Loads a CS_LOCALE structure with localization values or retrieve the locale name previously used to load a CS_LOCALE structure.	64
cs_locator	Retrieves information from a CS_LOCATOR variable, such as prefetched data, the total length of the large object (LOB) in the server, or the character representation of the locator pointer.	70
cs_locator_alloc	Allocates a CS_LOCATOR datatype structure.	74
cs_locator_drop	Deallocates a CS_LOCATOR datatype structure.	75
cs_manage_convert	Installs or retrieves a user-defined character set conversion routine.	75
cs_objects	Saves, retrieves, or clears objects and data associated with them.	82
cs_prop_ssl_localid	Specifies the path to the local ID (certificates) file.	89
cs_set_convert	Installs or retrieves a user-defined conversion routine.	89

Routines	Description	Page
cs_setnull	Defines a null substitution value to be used when binding or converting NULL data.	94
cs_sprintf	A common sprintf like function for all platforms, providing formatted output conversion. The result is always a NULL-terminated string.	96
cs_strbuild	Constructs native language message strings.	97
cs_strcmp	Compares two strings using a specified sort order.	99
cs_strlcat	Safe string concatenation function.	102
cs_strlcpy	Safe string copy function.	102
cs_time	Retrieves the current time.	103
cs_validate_cb	A Client-Library callback routine, registered through ct_callback.	105
cs_will_convert	Indicates whether a specific datatype conversion is available in the Client/Server libraries.	106

## cs\_calc

Description Performs an arithmetic operation on two operands.

Syntax CS\_RETURNCODE cs\_calc(context, op, datatype, var1, var2, dest)

```
CS_CONTEXT    *context;
CS_INT        op;
CS_INT        datatype;
CS_VOID       *var1;
CS_VOID       *var2;
CS_VOID       *dest;
```

Parameters *context*  
A pointer to a CS\_CONTEXT structure.

*op*  
One of the following symbolic values:

Value of op	Arithmetic operation	*dest Value on return
CS_ADD	Addition	var1 + var2
CS_SUB	Subtraction	var1 - var2
CS_MULT	Multiplication	var1 * var2
CS_DIV	Division	var1 /var2

*datatype*

One of the following symbolic values, to indicate the datatype of *var1*, *var2*, and *dest*:

Value of datatype	Indicates this datatype
CS_DECIMAL_TYPE	CS_DECIMAL
CS_MONEY_TYPE	CS_MONEY
CS_MONEY4_TYPE	CS_MONEY4
CS_NUMERIC_TYPE	CS_NUMERIC

\**var1*, \**var2*, and \**dest* must all be the same datatype as indicated by the value of *datatype*.

*var1*

A pointer to the first operand for the arithmetic operation.

*var2*

A pointer to the second operand for the arithmetic operation.

*dest*

A pointer to a destination buffer. If *cs\_calc* returns CS\_FAIL, \**dest* is not modified.

## Return value

*cs\_calc* can return the following values:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

Common reasons for a *cs\_calc* failure include:

- An invalid parameter
- Attempted division by 0
- Destination overflow

*cs\_calc* generates a CS-Library error message for most failure conditions. See “Error handling” on page 4.

## Usage

- *var1*, *var2*, and *dest* must have the same datatype, as indicated by the datatype parameter.
- In case of error, \**dest* is not modified.

## See also

*cs\_convert*

## cs\_cmp

Description Compares two data values.

Syntax CS\_RETCODE cs\_cmp(context, datatype, var1, var2,  
result)  
CS\_CONTEXT \*context;  
CS\_INT datatype;  
CS\_VOID \*var1;  
CS\_VOID \*var2;  
CS\_INT \*result;

Parameters

*context*

A pointer to a CS\_CONTEXT structure.

*datatype*

One of following symbolic values, to indicate the datatype of var1 and var2:

Value of datatype	Indicates this datatype
CS_DATE_TYPE	CS_DATE
CS_TIME_TYPE	CS_TIME
CS_DATETIME_TYPE	CS_DATETIME
CS_DATETIME4_TYPE	CS_DATETIME4
CS_DECIMAL_TYPE	CS_DECIMAL
CS_MONEY_TYPE	CS_MONEY
CS_MONEY4_TYPE	CS_MONEY4
CS_NUMERIC_TYPE	CS_NUMERIC
CS_BIGDATETIME_TYPE	CS_BIGDATETIME
CS_BIGTIME_TYPE	CS_BIGTIME

*var1*

A pointer to the first operand for the comparison.

*var2*

A pointer to the second operand for the comparison.

*result*

On successful return, *\*result* is set to indicate the result of the comparison:

Value of *result	Indicates
-1	<i>var1</i> is less than <i>var2</i> .
0	<i>var1</i> is equal to <i>var2</i> .
1	<i>var1</i> is greater than <i>var2</i> .

Return value

cs\_cmp can return the following values:



Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed. If <code>cs_cmp</code> returns CS_FAIL, <i>*result</i> is undefined.

The most common reason for a `cs_cmp` failure is an invalid parameter.

`cs_cmp` generates a CS-Library error message for most failure conditions. See “Error handling” on page 4.

#### Usage

- `cs_cmp` sets *\*result* to indicate the result of the comparison.
- *var1* and *var2* must have the same datatype, as indicated by the *datatype* parameter.
- To compare string values, an application can call `cs_strcmp`.

#### See also

`cs_calc`, `cs_convert`, `cs_strcmp`

## cs\_config

#### Description

Set or retrieve CS-Library properties.

#### Syntax

```
CS_RETCODE cs_config(context, action, property,
                    buffer, buflen, outlen)
```

```
CS_CONTEXT    *context;
CS_INT        action;
CS_INT        property;
CS_VOID       *buffer;
CS_INT        buflen;
CS_INT        *outlen;
```

#### Parameters

##### *context*

A pointer to a CS\_CONTEXT structure.

##### *action*

One of the following symbolic values:

action	cs_config
CS_SET	Sets the value of the property.
CS_GET	Retrieves the value of the property.
CS_CLEAR	Clears the value of the property by resetting it to its default value.

*property*

The property whose value is being set or retrieved, according to the following table:

**Table 2-1: Values for cs\_config property parameter**

Value of property	Controls	Action	*buffer is
CS_APPNAME	The name the application calls itself.	Set, retrieve, or clear.	A CS_CHAR string. The default is NULL.
CS_CONFIG_FILE	The name and path of the Open Client and Open Server runtime configuration file. Meaningful only when external configuration has been enabled by setting CS_EXTERNAL_CONFIG.	Set, retrieve, or clear.	A CS_CHAR string. The default is NULL, which means a platform-specific default is used. See “Runtime configuration file property” on page 17.
CS_DEFAULT_IFILE	The name and path to an alternate default interfaces file.	Set, retrieve, or clear.	A CS_CHAR string to the new interfaces file.
CS_EXTERNAL_CONFIG	Whether or not the Client-Library routine ct_init reads an external configuration file to set default property values.	Set, retrieve, or clear.	CS_TRUE or CS_FALSE. The default, CS_TRUE, is dependent on whether the external configuration file exists. See “External configuration property” on page 18.
CS_EXTRA_INF	Whether or not to return the extra information that is required when processing messages inline using a SQLCA, SQLCODE, or SQLSTATE structure.	Set, retrieve, or clear.	CS_TRUE or CS_FALSE. CS_FALSE is the default.
CS_LIBTCL_CFG	The name and path to an alternate <i>libtcl.cfg</i> file.	Set, retrieve, or clear.	A CS_CHAR string to the new <i>libtcl.cfg</i> configuration file.
CS_LOC_PROP	A CS_LOCALE structure that defines localization information for this context.	Set, retrieve, or clear.	A CS_LOCALE structure previously allocated by the application.
CS_MESSAGE_CB	The CS-Library message callback routine, which is an application-provided handler for CS-Library error and informational messages.	Set, retrieve, or clear.	If <i>action</i> is CS_SET, <i>*buffer</i> is the message callback routine. If <i>action</i> is CS_GET, <i>*buffer</i> is set to the address of the message callback routine that is currently installed. The default is NULL, which means no handler is installed.

Value of property	Controls	Action	*buffer is
CS_NOAPI_CHK	Whether or not CS-Library validates function arguments when library functions are called.	Set, retrieve, or clear.	CS_TRUE or CS_FALSE. CS_FALSE, the default, indicates that argument checking is performed.
CS_SYBASE_HOME	The location of an alternate Sybase home directory.	Set, retrieve, or clear.	A CS_CHAR string to the new Sybase home directory.
CS_USERDATA	User-allocated data.	Set, retrieve, or clear.	User-allocated data. A default is not applicable.
CS_VERSION	The version of CS-Library.	Retrieve only.	A symbolic code indicating the library version: <ul style="list-style-type: none"> <li>• CS_VERSION_100 indicates the context exhibits version 10.0 behavior.</li> <li>• CS_VERSION_110 indicates version 11.1 behavior.</li> <li>• CS_VERSION_120 indicates the context exhibits version 12.0 behavior.</li> <li>• CS_VERSION_125 indicates version 12.5 behavior.</li> <li>• CS_VERSION_150 indicates version 15.0 behavior.</li> <li>• CS_VERSION_155 indicates version 15.5 behavior.</li> <li>• CS_VERSION_157 indicates version 15.7 behavior.</li> </ul>

*buffer*

If a property value is being set, *buffer* points to the value to use in setting the property.

If a property value is being retrieved, *buffer* points to the space in which `cs_config` will place the value of the property.

If a property value is being cleared, pass *buffer* as NULL and *buflen* as CS\_UNUSED.

*buflen*

Generally, *buflen* is the length, in bytes, of *\*buffer*.

If a property value is being set and the value in *\*buffer* is null-terminated, pass *buflen* as CS\_NULLTERM.

If *\*buffer* is a fixed-length or symbolic value, pass *buflen* as CS\_UNUSED.

*outlen*

A pointer to an integer variable.

*outlen* is not used if a property value is being set.

If a property value is being retrieved, cs\_config sets *\*outlen* to the length, in bytes, of the requested information.

If the information is larger than *buflen* bytes, an application can use the value of *\*outlen* to determine how many bytes are needed to hold the information.

*outlen* can be passed as NULL if the application is setting a property value or does not require the output length of a retrieved value.

## Return value

cs\_config returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

## Usage

- There are three kinds of context properties:
  - Context properties specific to CS-Library
  - Context properties specific to Client-Library
  - Context properties specific to Server-Library

cs\_config sets and retrieves the values of CS-Library context properties. With the exception of CS\_LOC\_PROP, properties set using cs\_config affect only CS-Library.

ct\_config sets and retrieves the values of Client-Library-specific context properties. Properties set using ct\_config affect only Client-Library.

srv\_props sets and retrieves the values of Server-Library-specific context properties. Properties set using srv\_props affect only Server-Library.

- See the “Properties” topics page in the *Open Client Library/C Reference Manual* for information about Client-Library properties.

#### Application name property

- CS\_APPNAME specifies the name that the application calls itself.
- cs\_config sets the application name for a CS\_CONTEXT structure. In a Client-Library application, allocated connections inherit the application name from their parent CS\_CONTEXT structure.
- The application name specifies a section name in the Open Client and Open Server runtime configuration file. See “Runtime configuration file property” on page 17.
- CS\_APPNAME cannot be set, retrieved, or cleared unless the CS\_CONTEXT structure was allocated with CS\_VERSION\_110 or later.

#### Runtime configuration file property

- CS\_CONFIG\_FILE specifies the name and path to the Open Client and Open Server runtime configuration file.
- The default value is NULL, which means that the platform-specific default file will be used:
  - On UNIX platforms, the default file is `$$SYBASE/$SYBASE_OCS/config/ocs.cfg`, where `$$SYBASE` is the path to the Sybase installation directory; this path is specified as the value of the SYBASE environment variable.
  - On Windows platforms, the default file is `%SYBASE%\%SYBASE_OCS%\ini\ocs.cfg`, where `%SYBASE%` is the path to the Sybase installation directory; this path is specified as the value of the SYBASE environment variable.

---

**Note** The default value may be overridden by the environment variable, SYBOCS\_CFG.

---

- Setting the SYBOCS\_CFG environment variable overrides the CS\_EXTERNAL\_CONFIG default. Note that this only affects applications which do not set the value of CS\_CONFIG\_FILE via cs\_config.
- If the default external-configuration file exists, Client-Library reads configuration settings from it unless the application explicitly sets the CS\_EXTERNAL\_CONFIG property to CS\_FALSE. See “External configuration property” on page 18.
- CS\_CONFIG\_FILE cannot be set, retrieved, or cleared unless the CS\_CONTEXT structure was allocated with CS\_VERSION\_110 or later.

#### External configuration property

- CS\_EXTERNAL\_CONFIG controls whether the Client-Library routine ct\_init will read the Open Client and Open Server runtime configuration file to set default Client-Library property values for the CS\_CONTEXT structure.
- The name of the Open Client and Open Server runtime configuration file is specified with the CS\_CONFIG\_FILE property. See “Runtime configuration file property” on page 17.
- The default for CS\_EXTERNAL\_CONFIG, CS\_TRUE, depends on whether the default external-configuration file exists (see “Runtime configuration file property” on page 17). If the external-configuration file exists, then CS\_EXTERNAL\_CONFIG defaults to CS\_TRUE. Otherwise, CS\_EXTERNAL\_CONFIG defaults to CS\_FALSE.
- Configuration information is read from the section of the file labeled:

[*appname*]

where *appname* is the value of the CS\_APPNAME property. (See “Application name property” on page 17.) If the application has not set the CS\_APPNAME property, the configuration reads the section labeled:

[DEFAULT]

- The “Using the Open Client and Open Server Runtime Configuration File” topics page in the *Open Client Client-Library/C Reference Manual* describes the syntax and keywords for configuration file entries.
- CS\_EXTERNAL\_CONFIG cannot be set, retrieved, or cleared unless the CS\_CONTEXT structure is allocated with CS\_VERSION\_110 or later. (See cs\_ctx\_alloc.)

#### Extra Information property

- CS\_EXTRA\_INF determines whether or not CS-Library returns the extra information that is required to fill in a SQLCA, SQLCODE, or SQLSTATE structure.
- If an application is not retrieving messages into a SQLCA, SQLCODE, or SQLSTATE structure, the extra information is returned as ordinary CS-Library messages.

## Locale information property

- The `CS_LOC_PROP` property defines a `CS_LOCALE` structure that contains localization information for a context. Localization information includes a language, character set, datetime, money, and numeric formats, and a collating sequence.
- `CS_LOC_PROP` affects both CS-Library and Client-Library, because a new connection picks up default localization information from its parent context.
- If an application does not call `cs_config` to define localization information for a context, the context uses default localization information that it picks up from the operating system environment when it is allocated. If localization information is not available in the operating system environment, the context uses platform-specific default localization values.
- The `cs_loc_alloc` routine allocates a `CS_LOCALE` structure.

## CS-Library Message Callback property

- The `CS_MESSAGE_CB` property consists of a pointer to a user-supplied CS-Library message callback routine. The application uses this property to install a handler for error or informational messages from CS-Library.
  - The default value is `NULL`, meaning that no handler is installed.
  - An application function can be installed as a handler for CS-Library errors.
  - Once the handler is installed, CS-Library calls the handler when an error or exception occurs in a CS-Library routine.
- For a description and an example of coding a CS-Library error handler, see “Defining a CS-Library message callback” on page 6.
- The following code fragment demonstrates how a handler function is installed for CS-Library errors:

```

/*
** Install the function cslib_err_handler as the
** handler for CS-Library errors.
*/
if (cs_config(context, CS_SET, CS_MESSAGE_CB,
              (CS_VOID *)cslib_err_handler,
              CS_UNUSED, NULL)
    != CS_SUCCEEDED)
{
    /* Release the context structure.      */

```

```
(void)cs_ctx_drop(context);  
fprintf(stdout,  
        "Can't install CS-Lib error handler.\n"  
        "Exiting.\n");  
exit(1);  
}
```

- Client-Library applications that call CS-Library routines besides `cs_ctx_alloc` and `cs_ctx_drop` need dedicated CS-Library error handling. Applications should either install a CS-Library error handler or handle CS-Library errors inline with `cs_diag`.

---

**Note** CS-Library error messages are not sent to the Client-Library error handler.

---

- Callback error handlers for Client-Library and CS-Library are installed differently:
  - An application installs Client-Library callback routines by calling `ct_callback`.
  - An application installs a CS-Library message callback routine by calling `cs_config` to set the value of the `CS_MESSAGE_CB` property.

Aside from this difference, the CS-Library message callback is similar to the Client-Library client message callback. For general information on callback routines, see the “Callbacks” topics page in the *Open Client Client-Library/C Reference Manual*.

#### Argument checking for CS-Library calls

- The `CS_NOAPI_CHK` property determines whether or not CS-Library validates function arguments when a library function is called.
- If the value of `CS_NOAPI_CHK` is `CS_FALSE` (the default), then CS-Library checks arguments when API functions are called. Setting `CS_NOAPI_CHK` to `CS_TRUE` disables API checking.
- For argument checking, CS-Library validates the parameters passed with each function call. Pointers to CS-Library hidden structures such as `CS_LOCALE` are checked. Field values in structures are also checked for illegal combinations. If CS-Library finds invalid arguments and API checking is enabled, CS-Library generates error messages and the function fails. These messages can be trapped and displayed with a CS-Library callback error handler.



- If the value of `CS_NOAPI_CHK` is `CS_TRUE`, arguments are not validated before they are used. If the application passes invalid arguments to CS-Library, the application will not work right, resulting in memory corruption, memory access violations (UNIX “core dumps”), or incorrect results. No error messages are generated to warn the application of the condition. Do not disable API argument checking until the application has been completely debugged with API checking enabled.

---

**Warning!** Do not set `CS_NOAPI_CHK` to `CS_TRUE` unless your application has been completely debugged with the default setting (`CS_FALSE`).

---

#### User-allocated data property

- The `CS_USERDATA` property defines user-allocated data. This property allows an application to associate user data with a particular context structure.
- CS-Library copies the user data into internal data space. An application can then call `cs_config` at a later time to retrieve the data.
- If you do not include a string’s null terminator when calculating its length during the input stage, a call to `cs_config (CS_GET)` will return only the string (minus its null terminator). For example, if you input a 2-byte string with a null terminator, and specify the string’s length as 2 bytes, `cs_config (CS_GET)` will return only the string. If, on the other hand, you input a 2-byte string with a null terminator and specify the string’s length as 3 bytes, `cs_config (CS_GET)` will return the string and its null terminator.
- Although Client-Library also has a `CS_USERDATA` property, the Client-Library `CS_USERDATA` is set only at the connection and command levels.

#### Sybase home property

- The `CS_SYBASE_HOME` property specifies the name and path to an alternate Sybase home directory and overrides the environment variable `$SYBASE` (`%SYBASE%` for Windows).
- `CS_SYBASE_HOME` must be set before allocating a CS-Library context because the allocation of a context requires a valid Sybase home directory from which it will be set up. This means that `CS_SYBASE_HOME` must be set *before* calling `cs_ctx_alloc()` or `cs_ctx_global()`. `cs_config()` must be invoked with a `NULL` context to set `CS_SYBASE_HOME`. For example:

```
ret = cs_config(NULL, CS_SET, CS_SYBASE_HOME,
               "/work/NewSybase", CS_NULLTERM, NULL);
```

You can also use the -y option of the isql and bcp utilities to specify an alternate Sybase home directory.

#### libtcl.cfg file property

- The CS\_LIBTCL\_CFG property specifies the name and path to an alternate *libtcl.cfg* file. As in the CS\_SYBASE\_HOME property, CS\_LIBTCL\_CFG is set by cs\_config() using a NULL context and must be set before a CS-Library context is allocated. For example:

```
ret = cs_config(NULL, CS_SET, CS_LIBTCL_CFG,  
"/work/Sybase/OCS-15_5/config/libtcl.cfg",  
CS_NULLTERM, NULL);
```

#### Default interfaces file property

- The CS\_DEFAULT\_IFILE property specifies the name of an alternate *interfaces* file and its path. Unlike the CT-Library property CS\_IFILE, CS\_DEFAULT\_IFILE does not override the use of alternate directory services that have already been specified in the *libtcl.cfg* file. The primary purpose of CS\_DEFAULT\_IFILE is to set a new default location for the *interfaces* file, in case the *interfaces* file is being used as the directory service.
- A CS-Library context must be allocated before calling cs\_config() and it must be passed in cs\_config() while setting the CS\_DEFAULT\_IFILE property. For example:

```
ret = cs_config(ctx, CS_SET, CS_DEFAULT_IFILE,  
"/work/NewSybase/interfaces", CS_NULLTERM, NULL);
```

#### Version level property

- The CS\_VERSION property represents the version of CS-Library behavior that an application has requested using cs\_ctx\_alloc.
- An application can only retrieve the value of CS\_VERSION.
- Possible values for CS\_VERSION include the following:
  - CS\_VERSION\_100 indicates version 10.0 behavior
  - CS\_VERSION\_110 indicates version 11.1 behavior
  - CS\_VERSION\_120 indicates version 12.0 behavior
  - CS\_VERSION\_125 indicates version 12.5 behavior
  - CS\_VERSION\_150 indicates version 15.0 behavior.
  - CS\_VERSION\_155 indicates version 15.5 behavior.
  - CS\_VERSION\_157 indicates version 15.7 behavior.

See also `cs_ctx_alloc`, `ct_con_props`, `ct_config`, `ct_init`

## cs\_conv\_mult

**Description** Retrieves the conversion multiplier for converting character data from one character set to another.

**Syntax**

```
CS_RETCODE cs_conv_mult(context,
                        srcloc,
                        destloc,
                        conv_multiplier)
CS_CONTEXT *context;
CS_LOCALE *srcloc;
CS_LOCALE *destloc;
CS_INT *conv_multiplier;
```

**Parameters**

*context*

A pointer to a CS\_CONTEXT structure.

*srcloc*

A pointer to the CS\_LOCALE structure that describes the source variable's character set. This parameter cannot be NULL.

*destloc*

A pointer to the CS\_LOCALE structure that describes the destination variable's character set. This parameter cannot be NULL.

*conv\_multiplier*

A pointer to a CS\_INT variable. `cs_conv_mult` retrieves the conversion multiplier for conversions from the character set indicated by *srcloc* to the character set indicated by *destloc* and places it into *\*conv\_multiplier*.

**Return value**

`cs_conv_mult` returns the following values:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

The most common reason for a `cs_conv_mult` failure is an invalid parameter.

**Examples**

The following code fragment retrieves the conversion multiplier for conversions from the iso\_1 character set to the eucjis character set:

```
#define EXIT_ON_FAIL(context, ret, msg) \
{ if (ret != CS_SUCCEED) \
  { \
```

```
    fprintf(stdout, "Fatal error(%ld): %s\n", (long)ret, msg); \
    if (context != (CS_CONTEXT *)NULL) \
    { (CS_VOID)ct_exit(context, CS_FORCE_EXIT); \
      (CS_VOID)cs_ctx_drop(context); } \
    exit(-1); \
  } }
```

```
/** usa_locale uses the iso_1 character set.
 */
ret = cs_loc_alloc(context, &usa_locale);
EXIT_ON_FAIL(context, ret, "cs_loc_alloc(usa) failed.");
ret = cs_locale(context, CS_SET, usa_locale,
                CS_SYB_CHARSET, "iso_1", CS_NULLTERM, NULL);
EXIT_ON_FAIL(context, ret, "cs_locale(usa, CHARSET) failed.");

/*
 ** japan_locale uses eucjis.
 */
ret = cs_loc_alloc(context, &japan_locale);
EXIT_ON_FAIL(context, ret, "cs_loc_alloc(japan) failed.");

ret = cs_locale(context, CS_SET, japan_locale,
                CS_SYB_CHARSET, "eucjis", CS_NULLTERM, NULL);
EXIT_ON_FAIL(context, ret, "cs_locale(japan, CHARSET) failed.");

/*
 ** Get the conversion multiplier for iso_1 to eucjis conversions.
 */
ret = cs_conv_mult(context,
                   usa_locale, japan_locale, &conv_mult);
EXIT_ON_FAIL(context, ret, "cs_conv_mult(usa, japan) failed.");

fprintf(stdout,
        "Conversion multiplier for iso_1 to eucjis is %ld.\n",
        (long)conv_mult);
```

**Usage**

- cs\_conv\_mult retrieves the conversion multiplier for converting character data from one character set to another.
- The conversion multiplier allows an application to size the destination data space for conversion of character data into a different character set.
- When converted to another character set, character strings can grow or shrink in length, and applications need to make sure that the destination data space is large enough for the result. With a multi-byte character set destination, 1-byte in the source can convert to several bytes in the destination.

- Inconvertible characters are substituted with single-byte “?”, 2-byte “??” or 3-byte “0xefbfbfd” characters.
- A *conversion multiplier* equals the largest number of bytes in the destination that can replace 1 source byte.
- When converting a character string to a different character set, the application uses the conversion multiplier to size the destination data space, as follows:

$$\begin{aligned} \text{bytes\_needed} &= \text{conv\_mult} \\ &\quad * \text{srclen} \\ &\quad * \text{CS\_SIZEOF}(\text{CS\_BYTE}) \\ &\quad + \text{NTB} \end{aligned}$$

where:

- *bytes\_needed* is the necessary length, in bytes, of the destination data space.
- *conv\_mult* is the conversion multiplier value.
- *srclen* is the length, in bytes, of the source string.
- *NTB* is 1 if null termination is requested and 0 otherwise.
- See the *Open Client and Open Server International Developers Guide*.

See also

`cs_convert`, `cs_locale`, `cs_manage_convert`

## cs\_convert

Description	Converts a data value from one datatype, locale, or format to another datatype, locale, or format.
Syntax	<pre>CS_RETCODE cs_convert(context, srcfmt, srcdata,                       destfmt, destdata, resultlen) CS_CONTEXT *context; CS_DATAFMT *srcfmt; CS_VOID *srcdata; CS_DATAFMT *destfmt; CS_VOID *destdata; CS_INT *resultlen;</pre>
Parameters	<p><i>context</i> A pointer to a CS_CONTEXT structure.</p>

*srcfmt*

A pointer to a CS\_DATAFMT structure describing the source data format. The fields in *\*srcfmt* are used as follows:

Field name	Set it to
<i>datatype</i>	A type constant representing the type of the source data (CS_CHAR_TYPE, CS_BINARY_TYPE, and so on).
<i>maxlength</i>	The length of the data in the <i>*srcdata</i> buffer. This value is ignored for fixed-length datatypes or if <i>srcdata</i> is NULL.
<i>locale</i>	A pointer to a CS_LOCALE structure containing localization values for the source data, or NULL to use localization values from <i>*context</i> .

All other fields are ignored.

For general information on the CS\_DATAFMT structure, see the “CS\_DATAFMT Structure” topics page in the *Open Client Client-Library/C Reference Manual*.

*srcdata*

A pointer to the source data. To indicate that the source data represents a null value, pass *srcdata* as NULL. If *srcdata* is NULL, *cs\_convert* places the null substitution value for the datatype indicated by *destfmt*→*datatype* in *\*destdata*.

Table 2-18 on page 96 lists the default null substitution value for each datatype. An application can define custom null substitution values by calling *cs\_setnull*.

*destfmt*

A pointer to a CS\_DATAFMT structure describing the destination data format. Table 2-2 lists the fields in *\*destfmt* that are used.

**Table 2-2: CS\_DATAFMT fields for cs\_convert's \*destfmt parameter**

Field Name	Set it to
<i>datatype</i>	A type constant representing the desired destination datatype (CS_CHAR_TYPE, CS_BINARY_TYPE, and so on).
<i>maxlength</i>	The length of the <i>destdata</i> buffer.
<i>locale</i>	A pointer to a CS_LOCALE structure containing localization values for the destination data, or NULL to use localization values from <i>*context</i> .
<i>format</i>	A bit mask of the following symbols: <ul style="list-style-type: none"> <li>• For character and text destinations only, use CS_FMT_NULLTERM to null-terminate the data, or CS_FMT_PADBLANK to pad to the full length of the variable with spaces.</li> <li>• For character, binary, text, and image destinations, use CS_FMT_PADNULL to pad to the full length of the variable with nulls.</li> <li>• When converting from a character source to a character destination, use CS_FMT_SAFESTR to double any occurrences of the single-quote character (') in the destination. CS_FMT_SAFESTR can be combined with CS_FMT_NULLTERM, CS_FMT_PADBLANK, or CS_FMT_PADNULL.</li> <li>• For any type of destination, use CS_FMT_UNUSED if no format information is being provided.</li> </ul>
<i>scale</i>	The scale used for the destination variable. If the source data is the same type as the destination, <i>scale</i> can be set to CS_SRC_VALUE to indicate that the destination should pick up its value for <i>scale</i> from the source data. <i>scale</i> must be less than or equal to <i>precision</i> .
<i>precision</i>	The precision used for the destination variable. If the source data is the same type as the destination, <i>precision</i> can be set to CS_SRC_VALUE to indicate that the destination should pick up its value for <i>precision</i> from the source data. <i>precision</i> must be greater than or equal to <i>scale</i> .

All other fields are ignored.

For general information on the CS\_DATAFMT structure, see the “CS\_DATAFMT Structure” topics page in the *Open Client Client-Library/C Reference Manual*.

*destdata*

A pointer to the destination buffer space.

*resultlen*

A pointer to an integer variable. cs\_convert sets \*resultlen to the length, in bytes, of the data placed in \*destdata. If the conversion fails, cs\_convert sets \*resultlen to CS\_UNUSED.

resultlen is an optional parameter and can be passed as NULL.

*Datatype Conversion Chart*

Table 2-3 indicates which datatype conversions are supported by cs\_convert. The source datatypes are listed in the leftmost column and the destination datatypes are listed in the top row of the chart. “•” indicates that the conversion is supported; a blank space indicates that the conversion is not supported.

**Table 2-3: Datatype conversion chart**

Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_USMALLINT	CS_UINT	CS_UBIGINT	CS_UNITEXT	CS_XML		
CS_BINARY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•	
CS_LONGBINARY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_VARBINARY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_BIT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_CHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•		•	•	•	•	•	•
CS_LONGCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•		•	•	•	•	•	•
CS_VARCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•		•	•	•	•	•	•
CS_DATETIME			•		•	•	•	•	•													•	•	•	•	•							
CS_DATETIME4			•		•	•	•	•	•													•	•	•	•	•							
CS_TINYINT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_SMALLINT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_INT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_DECIMAL	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_NUMERIC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_FLOAT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_REAL	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_MONEY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_MONEY4	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•		•	•	•	•	•	•
CS_BOUNDARY					•	•	•													•		•											



Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_USMALLINT	CS_UINT	CS_UBIGINT	CS_UNITEXT	CS_XML
CS_SENSITIVITY					•	•													•	•											
CS_TEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
CS_IMAGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
CS_UNICHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						
CS_DATE			•		•	•	•	•	•												•										
CS_TIME			•		•	•	•	•	•												•				•						
CS_BIGINT	•	•	•	•	•	•	•			•															•						
CS_USMALLINT	•	•	•	•	•	•	•			•															•						
CS_UINT	•	•	•	•	•	•	•			•															•						
CS_UBIGINT	•	•	•	•	•	•	•			•															•						
CS_UNITEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_XML	•	•	•		•	•	•														•	•									•

Datetime Datatypes Conversion Chart

Table 2-4 indicates which datatype conversions are supported by cs\_convert for the datetime datatypes. The source datatypes are listed in the leftmost column, and the destination datatypes are listed in the top row of the chart. “•” indicates that the conversion is supported. A blank space indicates that the conversion is not supported.

Table 2-4: Datetime datatype conversions

Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_BIGDATETIME	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_BIGTIME	CS_UNITEXT		
CS_BINARY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•												
CS_LONGBINARY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•											
CS_VARBINARY	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•											
CS_BIT	•	•	•	•	•	•	•																								
CS_CHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•											

Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_BIGDATETIME	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_BIGTIME	CS_UNITEXT
CS_LONGCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_VARCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_DATETIME			•		•	•	•	•	•	•												•							
CS_DATETIME4			•		•	•	•	•	•	•																			
CS_BIGDATETIME			•		•	•	•	•	•	•																			•
CS_TINYINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_SMALLINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_INT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_DECIMAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_NUMERIC	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_FLOAT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_REAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_MONEY	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_MONEY4	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_BOUNDARY					•	•	•														•								
CS_SENSITIVITY					•	•	•															•							
CS_TEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_IMAGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_UNICHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_DATE			•		•	•	•	•	•	•												•			•				
CS_TIME			•		•	•	•	•	•	•												•			•				
CS_BIGINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_BIGTIME			•		•	•	•	•	•	•												•			•				•
CS_UNITEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•

Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_BIGDATETIME	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_BIGTIME	CS_UNITEXT
CS_LONGCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_VARCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_DATETIME			•		•	•	•	•	•	•												•			•	•			
CS_DATETIME4			•		•	•	•	•	•	•															•	•			
CS_BIGDATETIME			•		•	•	•	•	•	•															•	•			•
CS_TINYINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_SMALLINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_INT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_DECIMAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_NUMERIC	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_FLOAT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_REAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_MONEY	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_MONEY4	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•					
CS_BOUNDARY					•	•	•														•	•							
CS_SENSITIVITY					•	•	•															•	•						
CS_TEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_IMAGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_UNICHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_DATE			•		•	•	•	•	•	•												•		•	•				
CS_TIME			•		•	•	•	•	•	•												•		•	•				
CS_BIGINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•			•		
CS_BIGTIME			•		•	•	•	•	•	•												•		•	•			•	•
CS_UNITEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•

Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_BIGDATETIME	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_BIGTIME	CS_UNITEXT
CS_LONGCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_VARCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_DATETIME			•		•	•	•	•	•	•												•							
CS_DATETIME4			•		•	•	•	•	•	•													•						
CS_BIGDATETIME			•		•	•	•	•	•	•													•						•
CS_TINYINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_SMALLINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_INT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_DECIMAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_NUMERIC	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_FLOAT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_REAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_MONEY	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_MONEY4	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•				
CS_BOUNDARY					•	•	•														•		•						
CS_SENSITIVITY					•	•	•															•							
CS_TEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•
CS_IMAGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•
CS_UNICHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•
CS_DATE			•		•	•	•	•	•	•													•	•	•	•			
CS_TIME			•		•	•	•	•	•	•													•	•	•	•			
CS_BIGINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•			•	•	•			•	
CS_BIGTIME			•		•	•	•	•	•	•													•	•	•	•			•
CS_UNITEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•

Open Client datatypes	CS_BINARY	CS_LONGBINARY	CS_VARBINARY	CS_BIT	CS_CHAR	CS_LONGCHAR	CS_VARCHAR	CS_DATETIME	CS_DATETIME4	CS_BIGDATETIME	CS_TINYINT	CS_SMALLINT	CS_INT	CS_DECIMAL	CS_NUMERIC	CS_FLOAT	CS_REAL	CS_MONEY	CS_MONEY4	CS_BOUNDARY	CS_SENSITIVITY	CS_TEXT	CS_IMAGE	CS_UNICHAR	CS_DATE	CS_TIME	CS_BIGINT	CS_BIGTIME	CS_UNITEXT
CS_LONGCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_VARCHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CS_DATETIME			•		•	•	•	•	•	•												•			•	•			
CS_DATETIME4			•		•	•	•	•	•	•												•			•	•			
CS_BIGDATETIME			•		•	•	•	•	•	•												•			•	•		•	•
CS_TINYINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_SMALLINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_INT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_DECIMAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_NUMERIC	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_FLOAT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_REAL	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_MONEY	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_MONEY4	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•				
CS_BOUNDARY					•	•	•														•	•							
CS_SENSITIVITY					•	•	•														•	•							
CS_TEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_IMAGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_UNICHAR	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•
CS_DATE			•		•	•	•	•	•	•												•		•	•				
CS_TIME			•		•	•	•	•	•	•												•		•	•				
CS_BIGINT	•	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•		•	•	•	•		•	•	•
CS_BIGTIME			•		•	•	•	•	•	•												•		•	•		•	•	•
CS_UNITEXT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•

Conversion between CS\_BIGDATETIME and CS\_BIGTIME and the following datatypes is not supported:

- CS\_BLOB
- CS\_LONG
- CS\_UBIGINT
- CS\_UINT
- CS\_USHORT
- CS\_USMALLINT
- CS\_XML

All conversions to and from CS\_BIGDATETIME and CS\_BIGTIME are handled in the same way as existing datetime and time conversions.

#### Return value

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

A common reason for a cs\_convert failure is that CS-Library does not support the requested conversion.

cs\_convert conversion errors generate CS-Library error messages. See “Error handling” on page 4.

#### Usage

- To determine whether a particular conversion is permitted, use cs\_will\_convert.
- In Client-Library applications, ct\_bind sets up automatic, implicit data conversion, which makes it unnecessary for an application to explicitly convert result data that is bound to program variables.
- An application can install custom conversion routines by calling cs\_set\_convert. Once a custom routine for a particular type of conversion is installed, cs\_convert or ct\_bind call the custom routine whenever a conversion of that type is required.
- cs\_convert can convert between standard and user-defined datatypes. To enable these types of conversions, an application must install the appropriate custom conversion routines using cs\_set\_convert.
- See the “Types” topics page in the *Open Client Library/C Reference Manual*. For information about Adaptive Server Enterprise datatypes, see the *Adaptive Server Enterprise Reference Manual*.

## About specific conversions

- A conversion to or from *binary* and *image* datatypes is a straight byte-copy, except when the conversion involves *character* or *text* data. When converting character or text data to binary or image, `cs_convert` interprets the character or text string as hexadecimal, whether or not the string contains a leading “0x.” There must be a match in the lengths of binary data and fixed length data. If the data lengths do not match, there will be underflow or overflow.
- Converting a *money*, *character*, or *text* value to *float* can result in a loss of precision. Converting a float value to character or text can also result in a loss of precision.
- Any length mismatch in the conversion to and from binary and image datatypes cause error *underflow* or *overflow*. This may happen, for example, if you are converting 1-byte binary data to integer data. Use datatype `CS_TINYINT` (1-byte integer) to avoid an error.
- Converting a *float* value to *money* can result in overflow, because the maximum `CS_MONEY` value is \$922,337,203,685,477.5807, and the maximum `CS_MONEY4` value is \$214,748.3648.
- If overflow occurs when converting *integer* or *float* data to *character* or *text*, the first character of the resulting value will contain an asterisk (\*) to indicate the error.
- A conversion to *bit* has the following effect: If the value being converted is not 0, the bit value is set to 1; if the value is 0, the bit value is set to 0.
- When converting *decimal* or *numeric* data to decimal or numeric data, `CS_SRC_VALUE` can be used in *destfmt*→*scale* and *destfmt*→*precision* to indicate that the destination data should have the same scale and precision as the source. `CS_SRC_VALUE` is valid only when the source data is decimal or numeric.
- Conversion from and to the LOB locator types (`CS_TEXTLOCATOR_TYPE`, `CS_IMAGELOCATOR_TYPE`, and `CS_UNITEXTLOCATOR_TYPE`) follows specific rules.

Conversion from a LOB locator type to `CS_CHAR_TYPE` converts the 24-byte locator to its hexadecimal ASCII representation (without any additional leading “0x”). Any prefetch data in the `CS_LOCATOR` structure is ignored.

Conversion from a LOB locator type to itself is allowed. But the source and destination type of the LOB locators must be the same; for example, conversion from an image LOB locator type to a text LOB locator type is not allowed.

Conversion from a LOB locator to a text, image, or untext type obtain the prefetch data from the CS\_LOCATOR variables. Therefore, the datatype of the LOB locator must match the destination datatype. That is, conversion from CS\_TEXTLOCATOR\_TYPE to CS\_TEXT\_TYPE; from CS\_IMAGELOCATOR\_TYPE to CS\_IMAGE\_TYPE and CS\_UNITEXTLOCATOR\_TYPE to CS\_UNITEXT\_TYPE, are the only conversions allowed.

**Table 2-5: Supported LOB locator conversions**

	CS_TEXTLOCATOR_TYPE	CS_IMAGELOCATOR_TYPE	CS_UNITEXTLOCATOR_TYPE
CS_CHAR_TYPE	•	•	•
CS_TEXT_TYPE	•		
CS_IMAGE_TYPE		•	
CS_UNITEXT_TYPE			•
CS_TEXTLOCATOR_TYPE	•		
CS_IMAGELOCATOR_TYPE		•	
CS_UNITEXTLOCATOR_TYPE			•

---

**Note** Open Client and Open Server 15.0 and later support the unichar datatype. See Chapter 3, “Using Open Client and Open Server Datatypes,” in the *Open Client Client-Library/C Programmers Guide*.

---

#### Converting between character sets

- cs\_convert performs character set conversion when:
  - *srctype* and *desttype* both represent character-based types, and
  - *srctype*→*locale* specifies a different character set than *desttype*→*locale*.

The character-based types are CS\_CHAR, CS\_LONGCHAR, CS\_TEXT, CS\_UNITEXT, CS\_VARCHAR or CS\_XML.

- You can program an application to perform character-set conversion by following these steps:



- a Call `cs_loc_alloc` twice to allocate two `CS_LOCALE` structures, *src\_locale* and *dest\_locale*, which will be configured to describe the locale of the source data and destination data, respectively.
- b Configure the character set associated with *src\_locale* by calling `cs_locale`. The call can specify either a locale name or a character set name.
 

To use a character set name, pass *action* as `CS_SET`, *type* as `CS_SYB_CHARSET`, and *buffer* as the name of the character set. Repeat to configure the character set for *dest\_locale*.

To use a locale name, pass *action* as `CS_SET`, *type* as `CS_LC_CTYPE`, and *buffer* as a locale name (the character set associated with the locale name will be used). Repeat to configure the character set for *dest\_locale*.
- c (Optional) Call `cs_conv_mult` to get the conversion multiplier for conversions between *src\_locale*'s character set and *dest\_locale*'s character set. The conversion multiplier can be used to determine whether the result can possibly overflow the destination space.
- d Configure the `CS_DATAFMT` structures to describe the datatype, length, and format of the source and destination data. Set the *locale* field in the source `CS_DATAFMT` structure to *src\_locale*, and set the *locale* field in the destination `CS_DATAFMT` structure to *dest\_locale*.
- e Call `cs_convert` to perform the conversion. This step can be repeated as many times as necessary, using the configured `CS_LOCALE` and `CS_DATAFMT` structures.
- f Call `cs_loc_drop` to deallocate each of *src\_locale* and *dest\_locale* when they are no longer needed.

See also `cs_conv_mult`, `cs_manage_convert`, `cs_set_convert`, `cs_setnull`, `cs_will_convert`

## cs\_ctx\_alloc

Description Allocates a `CS_CONTEXT` structure.

Syntax `CS_RETCODE cs_ctx_alloc(version, ctx_pointer)`

```

CS_INT      version;
CS_CONTEXT  **ctx_pointer;

```

## Parameters

*version*

One of the following symbolic values, to indicate the intended version of CS-Library behavior:

<b>Value of version</b>	<b>Indicates</b>	<b>Features supported</b>
CS_VERSION_100	10.0 behavior	Initial version.
CS_VERSION_110	11.1 behavior	Unicode character set support. Use of external configuration files to control Client-Library property settings.
CS_VERSION_120	12.0 behavior	All above features.
CS_VERSION_125	12.5 behavior	unichar support, wide data and columns, SSL.
CS_VERSION_150	15.0 behavior	BCP partitions, BCP computed columns, large identifiers, Unilib®, Adaptive Server Enterprise default packet size, scrollable cursors, and clusters support. Also, support for unitext, xml, bigint, usmallint, uint, and ubigint datatypes. Note the Sybase library name change.
CS_VERSION_155	15.5 behavior	CS_BIGDATETIME and CS_BIGTIME datatypes and microsecond granularity for time data, ct_send_data enhancement, Open Server dynamic listeners, Open Client CS_RES_NOXNLMETADATA response capability, FIPS-140-2-compliant password encryption.

Value of version	Indicates	Features supported
CS_VERSION_157	15.7 behavior	Large object (LOB) locator support, LOBs as stored procedure parameters, In-row and off-row LOB support, Bulk-Library and <i>bcp</i> handling of nonmaterialized columns, Support for preserving trailing zeros, Nameless application configuration settings handling, TCP socket buffer size configuration, Expanded variable-length rows, Releasing locks at cursor close Row format caching,

*ctx\_pointer*

The address of a pointer variable. `cs_ctx_alloc` sets *\*ctx\_pointer* to the address of a newly allocated CS\_CONTEXT structure.

In case of error, `cs_ctx_alloc` sets *\*ctx\_pointer* to NULL.

## Return value

`cs_ctx_alloc` returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_MEM_ERROR	The routine failed because it could not allocate sufficient memory.
CS_FAIL	The routine failed for other reasons.

The most common reason for a `cs_ctx_alloc` failure is a misconfigured system environment. `cs_ctx_alloc` must read the locales file that specifies the default localization values for the allocated context. If CS-Library cannot find the locales file or if the locales file is misconfigured, `cs_ctx_alloc` fails.

**Note** When `cs_ctx_alloc` returns CS\_FAIL an extended error message is sent to standard error (SDTERR) and to the *sybinit.err* file that is created in the current working directory.

On most systems, the SYBASE environment variable or logical name specifies the location of the locales file. The *Open Client and Open Server Configuration Guide for Microsoft Windows* or *Open Client and Open Server Configuration Guide for UNIX* describes the environmental configuration required for CS-Library localization values.

Other common reasons for a cs\_ctx\_alloc failure include:

- Memory is insufficient.
- Localization files are missing.
- The value of the LANG environment variable does not match an entry in the locales file.

---

**Note** On platforms that have a standard error device, cs\_ctx\_alloc prints U.S. English error messages to the standard error device when CS-Library cannot find the locales file. For Windows and other platforms that lack a standard error device, U.S. English error messages are written to a text file called *sybinit.err* in the application's working directory.

---

## Examples

```
/*
** ex_init()
*/

CS_RETCODE CS_PUBLIC
ex_init(context)
CS_CONTEXT*   *context;
{
    CS_RETCODE      retcode;
    CS_INT          netio_type = CS_SYNC_IO;

    /* Get a context handle to use */
    retcode = cs_ctx_alloc(CS_VERSION_125, context);
    if (retcode != CS_SUCCEEDED)
    {
        ex_error("ex_init: cs_ctx_alloc() failed");
        return retcode;
    }

    /* Initialize Open Client */
    ...CODE DELETED.....

    /* Install client and server message handlers */
    ...CODE DELETED.....

    if (retcode != CS_SUCCEEDED)
```

```

    {
        ct_exit(*context, CS_FORCE_EXIT);
        cs_ctx_drop(*context);
        *context = NULL;
    }
return retcode;
}

```

## Usage

- A CS\_CONTEXT structure, also called a “context structure,” contains information that describes an application context. For example, a context structure contains default localization information and defines the version of CS-Library that is in use.
- Allocating a context structure is the first step in any Client-Library or Server-Library application.
- After allocating a CS\_CONTEXT structure, a Client-Library application typically customizes the context by calling `cs_config` and/or `ct_config` to create one or more connections within the context. A Server-Library application can customize a context by calling `cs_config` and `srv_props`.
- To deallocate a context structure, an application can call `cs_ctx_drop`.
- `cs_ctx_global` also allocates a context structure. The difference between `cs_ctx_alloc` and `cs_ctx_global` is that `cs_ctx_alloc` allocates a new context structure each time it is called, while `cs_ctx_global` allocates a new context structure only once, the first time it is called. On subsequent calls, `cs_ctx_global` simply returns a pointer to the existing context structure.
- To allow the use of `sigwait` in signal handling for multithreaded applications, both `cs_ctx_alloc` and `cs_ctx_global` will block signals the first time they are executed for a multi-threaded application. All these signals are blocked except for one dedicated thread, which is controlled by the Open Client/Open Server libraries. This thread will block the signal when a corresponding signal handler is installed using the `ct_callback` or `srv_signal` routines. A separate thread is subsequently spawned to invoke `sigwait` for this signal and to execute the appropriate user-provided signal handler function when the signal is received. For information on how to override this behavior and allow your application to handle thread signals itself, see the Chapter 2, “Client-Library Topics“ in the *Open Client Client-Library/C Reference Manual*.

## See also

`ct_con_alloc`, `ct_config`, `cs_ctx_drop`, `cs_ctx_global`, `cs_config`

## cs\_ctx\_drop

Description Deallocates a CS\_CONTEXT structure.

Syntax CS\_RETCODE cs\_ctx\_drop(context)

CS\_CONTEXT \*context;

Parameters *context*

A pointer to a CS\_CONTEXT structure.

Return value cs\_cxt\_drop returns:

Returns	Indicates
CS_SUCCEEDED	The routine completed successfully.
CS_FAIL	The routine failed.

cs\_ctx\_drop returns CS\_FAIL if the context contains an open connection.

### Examples

```
/*
** ex_ctx_cleanup()
**
** Parameters:
**   context      Pointer to context structure.
**   status       Status of last interaction with Client-
**               Library. If not ok, this routine will perform
**               a force exit.
**
** Returns:
**   Result of function calls from Client-Library.
*/
CS_RETCODE CS_PUBLIC
ex_ctx_cleanup(context, status)
CS_CONTEXT      *context;
CS_RETCODE      status;
{
    CS_RETCODE      retcode;
    CS_INT          exit_option;
    exit_option = (status != CS_SUCCEEDED) ? CS_FORCE_EXIT :
        CS_UNUSED;
    retcode = ct_exit(context, exit_option);
    if (retcode != CS_SUCCEEDED)
    {
        ex_error("ex_ctx_cleanup: ct_exit() failed");
        return retcode;
    }
}
```

```

retcode = cs_ctx_drop(context);
if (retcode != CS_SUCCEED)
{
    ex_error("ex_ctx_cleanup: cs_ctx_drop() failed");
    return retcode;
}
return retcode;
}

```

**Usage**

- A CS\_CONTEXT structure describes a particular context, or operating environment, for a set of server connections.
- Once a CS\_CONTEXT has been deallocated, it cannot be used again. To allocate a new CS\_CONTEXT, an application can call `cs_ctx_alloc`.

---

**Note** Sybase supports only one context handler per application program.

---

- A Client-Library application cannot call `cs_ctx_drop` to deallocate a CS\_CONTEXT structure until it has called `ct_exit` to clean up Client-Library space associated with the context.

**See also**

`cs_ctx_alloc`, `ct_close`, `ct_exit`

## **cs\_ctx\_global**

**Description**

Allocates or returns a CS\_CONTEXT structure.

**Syntax**

CS\_RETCODE `cs_ctx_global`(version, ctx\_pointer)

```

CS_INT      version;
CS_CONTEXT  **ctx_pointer;

```

## Parameters

*version*

One of the following symbolic values, to indicate the intended version of CS-Library behavior:

<b>Value of version</b>	<b>Indicates</b>	<b>Features supported</b>
CS_VERSION_100	10.0 behavior	Initial version.
CS_VERSION_110	11.1 behavior	Unicode character set support. Use of external configuration files to control Client-Library property settings.
CS_VERSION_120	12.0 behavior	All above features.
CS_VERSION_125	12.5 behavior	unichar support, wide data and columns, SSL.
CS_VERSION_150	15.0 behavior	BCP partitions, BCP computed columns, large identifiers, Unilib, Adaptive Server Enterprise default packet size, scrollable cursors, and clusters support. Also support for unitext, xml, bigint, usmallint, uint, and ubigint datatypes. Note Sybase library name change.
CS_VERSION_155	15.5 behavior	CS_BIGDATETIME and CS_BIGTIME datatypes and microsecond granularity for time data, ct_send_data enhancement, Open Server dynamic listeners, Open Client CS_RES_NOXNLMETADATA response capability, FIPS-140-2-compliant password encryption.



Value of version	Indicates	Features supported
CS_VERSION_157	15.7 behavior	Large object (LOB) locator support, LOBs as stored procedure parameters, In-row and off-row LOB support, Bulk-Library and <i>bcp</i> handling of nonmaterialized columns, Support for preserving trailing zeros, Nameless application configuration settings handling, TCP socket buffer size configuration, Expanded variable-length rows, Releasing locks at cursor close Row format caching.

If an application has already allocated a CS\_CONTEXT structure, *version* must match the version previously requested.

#### *ctx\_pointer*

The address of a pointer variable. `cs_ctx_global` sets *\*ctx\_pointer* to the address of a new or previously allocated CS\_CONTEXT structure.

In case of error, `cs_ctx_global` sets *\*ctx\_pointer* to NULL.

#### Return value

`cs_ctx_global` returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_MEM_ERROR	The routine failed because it could not allocate sufficient memory.
CS_FAIL	The routine failed for other reasons.

Common reasons for a `cs_ctx_global` failure include:

- A lack of available memory
- A *version* value that does not match a previously requested version

---

**Note** When `cs_ctx_global` returns CS\_FAIL an extended error message is sent to standard error (SDTERR) and to the *sybinit.err* file that is created in the current working directory.

---

The first `cs_ctx_global` call to execute in an application can fail due to configuration problems. See “Returns” under `cs_ctx_alloc` in this chapter.

**Usage**

- `cs_ctx_alloc` also allocates a context structure. The only difference between `cs_ctx_alloc` and `cs_ctx_global` is that `cs_ctx_alloc` allocates a new context structure each time it is called, while `cs_ctx_global` allocates a new context structure only once, the first time it is called. On subsequent calls, `cs_ctx_global` simply returns a pointer to the existing context structure.
- `cs_ctx_global` is of use in applications that need to access a single context structure from multiple independent modules.
- To allow the use of `sigwait` in signal handling for multithreaded applications, both `cs_ctx_alloc` and `cs_ctx_global` will block signals the first time they are executed for a multi-threaded application. All these signals are blocked except for one dedicated thread, which is controlled by the Open Client/Open Server libraries. This thread will block the signal when a corresponding signal handler is installed using the `ct_callback` or `srv_signal` routines. A separate thread is subsequently spawned to invoke `sigwait` for this signal and to execute the appropriate user-provided signal handler function when the signal is received. For information on how to override this behavior and allow your application to handle thread signals itself, see the Chapter 2, “Client-Library Topics” in the *Open Client Client-Library/C Reference Manual*.
- See `cs_ctx_alloc` in this chapter.

**See also**

`cs_ctx_alloc`, `cs_ctx_drop`, `cs_config`, `ct_con_alloc`, `ct_config`

## cs\_diag

**Description**

Manages inline error handling.

**Syntax**

```
CS_RETCODE cs_diag(context, operation, type, index,  
                  buffer)
```

```
CS_CONTEXT *context;  
CS_INT      operation;  
CS_INT      type;  
CS_INT      index;  
CS_VOID     *buffer;
```

**Parameters**

*context*

A pointer to a `CS_CONTEXT` structure.

*operation*

The operation to perform. Table 2-6 on page 48 lists the legal symbolic values for *operation*.

*type*

Depending on the value of *operation*, *type* indicates either the type of structure to receive message information or the type of message on which to operate, or both.

Possible values are:

Value of type	Indicates
SQLCA_TYPE	A SQLCA structure.
SQLCODE_TYPE	A SQLCODE structure, which is a long integer.
SQLSTATE_TYPE	A SQLSTATE structure, which is a 6-element character array.
CS_CLIENTMSG_TYPE	A CS_CLIENTMSG structure. Also used to indicate CS-Library messages.

*index*

The index of the message of interest. The first message has an index of 1, the second an index of 2, and so forth.

*buffer*

A pointer to data space.

Depending on the value of *operation*, *buffer* can point to a structure or a CS\_INT.

## Return value

*cs\_diag* returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.
CS_NOMSG	The application attempted to retrieve a message whose index is higher than the highest valid index. For example, the application attempted to retrieve message number 3 but only 2 messages were available.

Common reasons for a *cs\_diag* failure include:

- Invalid *context*
- Inability to allocate memory
- Invalid parameter combination

## Usage

**Table 2-6: Summary of cs\_diag parameter usage**

Value of operation	cs_diag	type is	index is	buffer is
CS_INIT	Initializes inline error handling.	CS_UNUSED	CS_UNUSED	NULL
CS_MSGLIMIT	Sets the maximum number of messages to store.	CS_CLIENTMSG_TYPE	CS_UNUSED	A pointer to an integer value.
CS_CLEAR	Clears message information for this context. If <i>buffer</i> is not NULL, <i>cs_diag</i> also clears the <i>*buffer</i> structure by initializing it with blanks and/or NULLs, as appropriate.	One of the legal <i>type</i> values.	CS_UNUSED	A pointer to a structure whose type is defined by <i>type</i> , or NULL.
CS_GET	Retrieves a specific message.	One of the legal <i>type</i> values.	The one-based index of the message to retrieve.	A pointer to a structure whose type is defined by <i>type</i> .
CS_STATUS	Returns the current number of stored messages.	CS_CLIENTMSG_TYPE	CS_UNUSED	A pointer to an integer value.

- An application that includes calls to CS-Library can handle CS-Library messages in one of two ways:
  - The application can call `cs_config` to install a CS-Library message callback, or
  - The application can handle CS-Library messages inline, using `cs_diag`.

An application can switch back and forth between the inline method and the callback method:

- Installing a CS-Library message callback turns off inline message handling. Any saved messages are discarded.

- Likewise, `cs_diag(CS_INIT)` “de-installs” an application’s CS-Library message callback. If the application has a message callback installed when `cs_diag(CS_INIT)` is called, the application’s first `CS_GET` call to `cs_diag` will retrieve a warning message to this effect.

If a CS-Library message callback is not installed and inline message handling is not enabled, CS-Library discards message information.

- `cs_diag` manages inline message handling for a specific context. If an application has more than one context, it must make separate `cs_diag` calls for each context.
- In a multithreaded application, `cs_diag` reports only those messages that pertain to CS-Library calls made by the thread which has called `cs_diag`. See the “Multithreaded Programming” topics page in the *Open Client Client-Library/C Reference Manual*.
- `cs_diag` allows an application to retrieve message information into a `CS_CLIENTMSG` structure or a `SQLCA`, `SQLCODE`, or `SQLSTATE` structure. When retrieving messages, `cs_diag` assumes that *buffer* points to a structure of the type indicated by *type*.

An application that is retrieving messages into a `SQLCA`, `SQLCODE`, or `SQLSTATE` structure must set the CS-Library context property `CS_EXTRA_INF` to `CS_TRUE`. This is because the SQL structures contain information that is not ordinarily returned by CS-Library’s error-handling mechanism.

An application that is not using the SQL structures can also set `CS_EXTRA_INF` to `CS_TRUE`. In this case, the extra information is returned as standard CS-Library messages.

- If `cs_diag` does not have sufficient internal storage space in which to save a new message, it throws away all unread messages and stops saving messages. The next time it is called with *operation* as `CS_GET`, it returns a special message to indicate the space problem.

After returning this message, `cs_diag` starts saving messages again.

#### Initializing inline error handling

- To initialize inline error handling, an application calls `cs_diag` with *operation* as `CS_INIT`.
- Generally, if a context will use inline error handling, the application should call `cs_diag` to initialize inline error handling for the context immediately after allocating it.

### Clearing messages

- To clear message information for a context, an application calls `cs_diag` with *operation* as `CS_CLEAR`.
  - `cs_diag` assumes that *buffer* points to a structure whose datatype corresponds to the value of *type*.
  - `cs_diag` clears the *\*buffer* structure by setting it to blanks and/or NULLs, as appropriate.
- Message information is not cleared until an application explicitly calls `cs_diag` with *operation* as `CS_CLEAR`. Retrieving a message does not remove it from the message queue.

### Retrieving messages

- To retrieve message information, an application calls `cs_diag` with *operation* as `CS_GET`, *type* as the type of structure in which to retrieve the message, *index* as the one-based index of the message of interest, and *\*buffer* as a structure of the appropriate type.
- `cs_diag` fills in the *\*buffer* structure with the message information.
- If an application attempts to retrieve a message whose index is higher than the highest valid index, `cs_diag` returns `CS_NOMSG` to indicate that no message is available.
- See the “SQLCA Structure,” “SQLCODE Structures,” “SQLSTATE structure,” and “CS\_CLIENTMSG Structure” topics pages in the *Open Client Client-Library/C Reference Manual* for information on these structures.

### Limiting messages

- If an application runs on platforms with limited memory, you may want to limit the number of messages that CS-Library saves in that application.
- To limit the number of saved messages, an application calls `cs_diag` with *operation* as `CS_MSGLIMIT` and *type* as `CS_CLIENTMSG_TYPE`.
- When a message limit is reached, CS-Library discards any new messages.
- An application cannot set a message limit that is less than the number of messages currently saved.
- CS-Library’s default behavior is to save an unlimited number of messages. An application can restore this default behavior by setting a message limit of `CS_NO_LIMIT`.

Retrieving the number of messages

- To retrieve the number of current messages, an application calls `cs_diag` with *operation* as `CS_STATUS` and *type* as the `CS_CLIENTMSG_TYPE`.

See also

`ct_callback`, `ct_options`

## cs\_dt\_crack

**Description** Converts a machine-readable datetime value into a user-accessible format.

**Syntax** `CS_RETCODE cs_dt_crack(context, datatype, dateval, daterec)`

```
CS_CONTEXT    *context;
CS_INT        datatype;
CS_VOID       *dateval;
CS_DATEREC    *daterec;
```

**Parameters**

*context*

A pointer to a `CS_CONTEXT` structure.

*datatype*

A symbolic value indicating the datatype of *\*dateval*:

Value of datatype	Indicates
<code>CS_DATE_TYPE</code>	<code>CS_DATE</code> <i>*dateval</i> .
<code>CS_TIME_TYPE</code>	<code>CS_TIME</code> <i>*dateval</i>
<code>CS_DATETIME_TYPE</code>	A <code>CS_DATETIME</code> <i>*dateval</i> .
<code>CS_DATETIME4_TYPE</code>	A <code>CS_DATETIME4</code> <i>*dateval</i> .
<code>CS_BIGDATETIME_TYPE</code>	<code>CS_BIGDATETIME</code> <i>*dateval</i> .
<code>CS_BIGTIME_TYPE</code>	<code>CS_BIGTIME</code> <i>*dateval</i>

*dateval*

A pointer to the date, time, or datetime value to be converted.

*daterec*

A pointer to a CS\_DATEREC structure. *cs\_dt\_crack* fills this structure with the translated date, time, or datetime value. A CS\_DATEREC is defined as follows:

```
typedef struct cs_daterec {
    CS_INT    dateyear;      /* year          */
    CS_INT    datemonth;    /* month         */
    CS_INT    datedmonth;   /* day of month  */
    CS_INT    datedyear;    /* day of year   */
    CS_INT    datedweek;    /* day of week   */
    CS_INT    datehour;     /* hour          */
    CS_INT    dateminute;   /* minute        */
    CS_INT    dateseccond;  /* second        */
    CS_INT    datemsecond;  /* millisecond   */
    CS_INT    datetzone;    /* timezone      */
    CS_INT    datesecfrac;  /* second fractions */
    CS_INT    datesecprec;  /* precision     */
} CS_DATEREC;
```

where:

- *dateyear* is a value greater than or equal to 1900.
- *datemonth* is a value from 0 to 11.
- *datedmonth* is a value from 1 to 31.
- *datedyear* is a value from 1 to 366.
- *datedweek* is a value from 0 to 6.
- *datehour* is a value from 0 to 23.
- *dateminute* is a value from 0 to 59.
- *dateseccond* is a value from 0 to 59.
- *datemsecond* is a value from 0 to 999.
- *datetzone* is reserved for future use. *cs\_dt\_crack* does not set this field.
- *datesecfrac* is the number of second fractions. This field is used only with datetime datatypes having a level of precision greater than milliseconds.
- *datesecprec* is the precision. For CS\_BIGDATETIME and CS\_BIGTIME, this field is always 10<sup>6</sup>. This field is used only with datetime datatypes having a level of precision greater than milliseconds.



The meanings of these numbers vary according to an application's locale. For example, if localization information specifies that Sunday is the first day of the week, then a *datedweek* value of 2 represents Tuesday. If localization information specifies that Monday is the first day of the week, then a *datedweek* value of 2 represents Wednesday.

An application can call `cs_dt_info` to find out what date-related localization values are in effect.

The time zone field (*datetzone*) is reserved for future use. This field will not be set.

See the "International Support" topics page in the *Open Client Client-Library/C Reference Manual*.

## Return value

`cs_dt_crack` returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

The most common reason for a `cs_dt_crack` failure is an invalid parameter.

## Usage

- `cs_dt_crack` converts a date, time or datetime value into its integer components and places those components into a `CS_DATEREC` structure.
- Datetime values are stored in an internal format. For example, a `CS_DATETIME` value is stored as the number of days since January 1, 1900 plus the number of three hundredths of a second since midnight. `cs_dt_crack` converts a value of this type into a format that an application can more easily access.
- For datetime datatypes with a precision level up to and including milliseconds, second fractions are stored in the *datemsecond* field, and the *datesecfrac* field is not used. For datetime datatypes with a precision level of microseconds and higher, second fractions are stored in the *datesecfrac* field, and the *datemsecond* field is not used. Applications that call the `cs_dt_crack` routine must therefore determine where to find second fractions based on the datetime datatypes that are being used.

## See also

`cs_dt_info`

## cs\_dt\_info

**Description** Sets or retrieves language-specific date, time, or datetime information.

**Syntax** CS\_RETCODE cs\_dt\_info(context, action, locale, type, item, buffer, buflen, outlen)

```
CS_CONTEXT *context;
CS_INT action;
CS_LOCALE *locale;
CS_INT type;
CS_INT item;
CS_VOID *buffer;
CS_INT buflen;
CS_INT *outlen;
```

**Parameters**

*context*

A pointer to a CS\_CONTEXT structure.

When retrieving date, time, or datetime information, if *locale* is NULL, cs\_dt\_info uses the default locale information contained in this context structure.

*action*

One of the following symbolic values:

Value of action	cs_dt_info
CS_SET	Sets a date, time, or datetime conversion format.
CS_GET	Retrieves date, time or datetime information.

*locale*

A pointer to a CS\_LOCALE structure. A locale structure contains locale information, including datetime information.

When setting datetime information, *locale* must be supplied.

When retrieving datetime information, *locale* can be NULL. If *locale* is NULL, cs\_dt\_info uses the default locale information contained in *\*context*.

*type*

The type of information of interest. Table 2-7 lists the symbolic values that are legal for *type*.

*item*

When retrieving information, *item* is the item number of the type category to retrieve. For example, to retrieve the name of the first month, an application passes *type* as CS\_MONTH and *item* as 0.

When setting a datetime conversion format, pass *item* as CS\_UNUSED.

*buffer*

If datetime information is being retrieved, *buffer* points to the space in which *cs\_dt\_info* will place the requested information.

If *buflen* indicates that *\*buffer* is not large enough to hold the requested information, *cs\_dt\_info* sets *\*outlen* to the length of the requested information and returns CS\_FAIL.

If a datetime conversion format is being set, *buffer* points to a symbolic value representing a conversion format.

*buflen*

The length, in bytes, of *\*buffer*.

If *item* is CS\_12HOUR, pass *buflen* as CS\_UNUSED.

*outlen*

A pointer to an integer variable.

*cs\_dt\_info* sets *\*outlen* to the length, in bytes, of the requested information.

If the requested information is larger than *buflen* bytes, an application can use the value of *\*outlen* to determine how many bytes are needed to hold the information.

## Return value

*cs\_dt\_info* returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

The most common reason for a *cs\_dt\_info* failure is an invalid parameter.

## Usage

**Table 2-7: Summary of *cs\_dt\_info* parameter usage**

Value of type	<i>cs_dt_info</i>	action can be	item can be	<i>*buffer</i> is
CS_MONTH	Retrieves the month name string.	CS_GET	0–11	A character string.
CS_SHORTMONTH	Retrieves the short month name string.	CS_GET	0–11	A character string.
CS_DAYNAME	Retrieves the day name string.	CS_GET	0–6	A character string.
CS_DATEORDER	Retrieves the date order string.	CS_GET	CS_UNUSED	A string containing the three characters “m,” “d,” and “y” to indicate the position of the month, day, and year in the datetime format.

Value of type	cs_dt_info	action can be	item can be	*buffer is
CS_12HOUR	Retrieves whether or not the language uses 12-hour time formats.	CS_GET	CS_UNUSED	CS_TRUE if 12-hour formats are used; CS_FALSE if 24-hour formats are used.
CS_DT_CONVFMT	Sets or retrieves the datetime conversion format.	CS_GET or CS_SET	CS_UNUSED	A symbolic value. See the Comments section, below, for a list of possible values.

- cs\_dt\_info sets or retrieves native language-specific datetime information:
  - cs\_dt\_info can return native language date part names, date part ordering information, datetime format information, and whether or not the language uses 12-hour date formats.
  - cs\_dt\_info can set datetime format information.
- If *locale* is NULL, cs\_dt\_info looks for native language locale information in *\*context*. An application can set locale information for a CS\_CONTEXT by calling cs\_config with *property* as CS\_LOC\_PROP.

If not specifically set, locale information in a CS\_CONTEXT defaults to information that CS-Library picks up from the operating system when the context is allocated. If locale information is not available from the operating system, CS-Library uses platform-specific localization values in the new context.

- A locale's date-order string, which can be retrieved by calling cs\_dt\_info with *type* as CS\_DATEORDER, describes how ambiguous date strings are resolved when converting from character datatypes to CS\_DATE, CS\_DATETIME or CS\_DATETIME4. For example, "04/05/96" could be interpreted as "April 5, 1996" or "May 4, 1996." The former result corresponds to the date-order string of "mdy", and the latter corresponds to "dmy."

Although an application cannot set a locale's date-order string directly, it can call cs\_locale and change the national-language used when converting dates. To do this, the application calls cs\_locale with *action* as CS\_SET, *type* as CS\_LC\_TIME, and *\*buffer* as a locale name. The application can specify a locale whose national language is configured to use a different date-order string. A national language's date-order string is configured as follows:

- For each national language, a *common.loc* file is located in a language subdirectory in the \$SYBASE/locales/messages subdirectory.

- The “dateformat” setting in the [datetime] section of the file specifies the date-order string. For example:

```
[datetime]
dateformat=dmy
```

See the *Open Client and Server Configuration Guide for Microsoft Windows* or *Open Client and Server Configuration Guide for UNIX*.

- The date conversion format, which can be set or retrieved by calling `cs_dt_info` with *type* as `CS_DT_CONVFMT`, describes the format of the result when a `CS_DATE`, `CS_TIME`, `CS_DATETIME`, `CS_DATETIME4`, `CS_BIGDATETIME` or `CS_BIGTIME` value is converted to a character-based datatype.
- Table 2-8 lists the values that are legal for *\*buffer* when *type* is `CS_DT_CONVFMT` in conversions from `CS_CHAR` to `CS_DATETIME`, `CS_DATE`, or `CS_TIME`. This conversion format is also used to describe results when a character string is converted to any of these datetime datatypes.

**Table 2-8: Values for \*buffer when type is CS\_DT\_CONVFMT (cs\_dt\_info)**

Symbolic value	CS_CHAR converted from CS_DATETIME, for example: Aug 24 2009 5:36PM	CS_CHAR converted from CS_DATE, for example: Aug 24 2009	CS_CHAR converted from CS_TIME, for example: 5:36PM
CS_DATES_HM	hh:mm 17:36	hh:mm 00:00	hh:mm 17:36
CS_DATES_HMA	hh:mm[AM PM] 5:36PM	hh:mm 12:00AM	hh:mm 5:36PM
CS_DATES_HMS	hh:mm:ss 17:36:00	hh:mm:ss 00:00:00	hh:mm:ss 17:36:00
CS_DATES_HMS_ALT	hh:mm:ss 17:36:32	hh:mm:ss 00:00:00	hh:mm:ss 17:36:32
CS_DATES_HMSZA	hh:mm:ss:zzz[AM PM] 5:36:00:000PM	hh:mm:ss:zzz[AM PM] 12:00:00:000AM	hh:mm:ss:zzz[AM PM] 5:36:00:000PM
CS_DATES_HMSZ	hh:mm:ss:zzz 17:36:00:000	hh:mm:ss:zzz 00:00:00:000	hh:mm:ss:zzz 17:36:00:000
CS_DATES_LONG	mon dd yyyy hh:mm:ss:zzz [AM PM] Aug 24 2009 05:36:00:000PM	mon dd yyyy Aug 24 2009	hh:mm:ss:zzz [AM PM] 05:36:00:000PM

<b>Symbolic value</b>	<b>CS_CHAR converted from CS_DATETIME, for example: Aug 24 2009 5:36PM</b>	<b>CS_CHAR converted from CS_DATE, for example: Aug 24 2009</b>	<b>CS_CHAR converted from CS_TIME, for example: 5:36PM</b>
CS_DATES_LONG_ALT	mon dd yyyy hh:mm:ss:zzz [AM PM]  Aug 24 2009 05:36:00:000PM	mon dd yyyy hh:mm:ss:zzz [AM PM]  Aug 24 2009 12:00:00:000 AM	mon dd yyyy hh:mm:ss:zzz [AM PM]  Jan 01 1900 05:36:00:000 PM
CS_DATES_MDYHMS	mon dd yyyy hh:mm:ss  Aug 24 2009 17:36:00	mon dd yyyy  Aug 24 2009	hh:mm:ss  17:36:00
CS_DATES_MDYHMS_ALT	mon dd yyyy hh:mm:ss  Aug 24 2009 17:36:00	mon dd yyyy hh:mm:ss  Aug 24 2009 00:00:00	mon dd yyyy hh:mm:ss  Jan 1 1900 17:36:00
CS_DATES_SHORT	mon dd yyyy hh:mm [AM PM]  Aug 24 2009 5:36PM	mon dd yyyy  Aug 24 2009	hh:mm [AM PM]  5:36PM
CS_DATES_SHORT_ALT	mon dd yyyy hh:mm [AM PM]  Aug 24 2009 5:36PM	mon dd yyyy hh:mm [AM PM]  Aug 24 2009 12:00AM	mon dd yyyy hh:mm [AM PM]  Jan 1 1900 5:36PM
CS_DATES_DMY1	dd/mm/yy  24/08/09	dd/mm/yy  24/08/09	
CS_DATES_DMY1_Y YYY	dd/mm/yyyy  24/08/2009	dd/mm/yyyy  24/08/2009	
CS_DATES_DYM1	dd/yy/mm  24/09/08	dd/yy/mm  24/09/08	
CS_DATES_DYM1_Y YYY	dd/yyyy/mm  24/2009/08	dd/yy/mm  24/2009/08	
CS_DATES_MDY1	mm/dd/yy  08/24/09	mm/dd/yy  08/24/09	
CS_DATES_MDY1_Y YYY	mm/dd/yyyy  08/24/2009	mm/dd/yyyy  08/24/2009	
CS_DATES_MYD1	mm/yy/dd  08/09/24	mm/yy/dd  08/2009/24	
CS_DATES_MYD1_Y YYY	mm/yyyy/dd  08/2009/24	mm/yyyy/dd  08/2009/24	
CS_DATES_YDM1	yy/dd/mm  09/24/08	yy/dd/mm  09/24/08	

<b>Symbolic value</b>	<b>CS_CHAR converted from CS_DATETIME, for example: Aug 24 2009 5:36PM</b>	<b>CS_CHAR converted from CS_DATE, for example: Aug 24 2009</b>	<b>CS_CHAR converted from CS_TIME, for example: 5:36PM</b>
CS_DATES_YDM1_Y YYY	yyyy/dd/mm 2009/24/08	yyyy/dd/mm 2009/24/08	
CS_DATES_YMD1	yy.mm.dd 09.08.24	yy.mm.dd 09.08.24	
CS_DATES_YMD1_Y YYY	yyyy.mm.dd 2009.08.24	yyyy.mm.dd 2009.08.24	
CS_DATES_DMY2	dd.mm.yy 24.08.09	dd.mm.yy 24.08.09	
CS_DATES_DMY2_Y YYY	dd.mm.yyyy 24.08.2009	dd.mm.yyyy 24.08.2009	
CS_DATES_MDY2	mon dd, yy Aug 24, 09	mon dd, yy Aug 24, 09	
CS_DATES_MDY2_Y YYY	mon dd, yyyy Aug 24, 2009	mon dd, yyyy Aug 24, 2009	
CS_DATES_YMD2	yy/mm/dd 09/08/24	yy/mm/dd 09/08/24	
CS_DATES_YMD2_Y YYY	yyyy/mm/dd 2009/08/24	yyyy/mm/dd 2009/08/24	
CS_DATES_DMY3	dd-mm-yy 24-08-09	dd-mm-yy 24-08-09	
CS_DATES_DMY3_Y YYY	dd-mm-yyyy 24-08-2009	dd-mm-yyyy 24-08-2009	
CS_DATES_MDY3	mm-dd-yy 08-24-09	mm-dd-yy 08-24-09	
CS_DATES_MDY3_Y YYY	mm-dd-yyyy 08-24-2009	mm-dd-yyyy 08-24-2009	
CS_DATES_YMD3	yyymmdd 090824	yyymmdd 090824	
CS_DATES_YMD3_Y YYY	yyyymmdd 20090824	yyyymmdd 20090824	
CS_DATES_YMDTH MS 23	yyyy-mm-ddThh:mm:ss 2009-08-24T17:36:00	yyyy-mm-dd 2009-08-24	hh:mm:ss 17:36:00
CS_DATES_DMY4	dd mon yy 24 Aug 09	dd mon yy 24 Aug 09	

Symbolic value	CS_CHAR converted from CS_DATETIME, for example: Aug 24 2009 5:36PM	CS_CHAR converted from CS_DATE, for example: Aug 24 2009	CS_CHAR converted from CS_TIME, for example: 5:36PM
CS_DATES_DMY4_Y YYY	dd mon yyyy 24 Aug 2009	dd mon yyyy 24 Aug 2009	

- Table 2-9 lists the values that are legal for *\*buffer* when *type* is CS\_DT\_CONVFMT in conversions between CS\_CHAR and CS\_BIGDATETIME and CS\_BIGTIME:



**Table 2-9: Values for \*buffer when type is CS\_DT\_CONVFMT (cs\_dt\_info)**

Symbolic value	CS_CHAR converted from CS_BIGDATETIME, for example: Aug 24 2009 5:36PM	CS_CHAR converted from CS_BIGTIME, for example: 5:36PM
CS_DATES_HMSUSA, or CS_DATES_HMSUSA_YYYY	hh:mm:ss.zzzzzz[AM PM] 5:36:00.000000PM	hh:mm:ss.zzzzz[AM PM] 5:36:00.000000PM
CS_DATES_HMSUS, or CS_DATES_HMSUS_YYYY	hh:mm:ss.zzzzzz 17:36:00.000000	hh:mm:ss.zzzzzz 17:36:00.000000
CS_DATES_LONGUSA	mon dd yy hh:mm:ss.zzzzzz[AM PM] Aug 24 09 5:36:00.000000PM	mon dd yy hh:mm:ss.zzzzzz[AM PM] Jan 1 01 5:36:00.000000PM
CS_DATES_LONGUSA_YYYY	mon dd yyyy hh:mm:ss.zzzzzz[AM PM] Aug 24 2009 5:36:00.000000PM	mon dd yyyy hh:mm:ss.zzzzzz[AM PM] Jan 1 0001 5:36:00.000000PM
CS_DATES_LONGUS	mon dd yy hh:mm:ss.zzzzzz Aug 24 09 17:36:00.000000	mon dd yy hh:mm:ss.zzzzzz Jan 1 01 17:36:00.000000
CS_DATES_LONGUS_YYYY	mon dd yyyy hh:mm:ss.zzzzzz Aug 24 2009 17:36:00.000000	mon dd yy hh:mm:ss.zzzzzz Jan 0 0001 17:36:00.000000
CS_DATES_YMDHMSUS_YYYY	yyyy-mm-dd hh:mm:ss.zzzzzz 2009-08-24 17:36:00.000000	yyyy-mm-dd hh:mm:ss.zzzzzz 0001-01-01 17:36:00.000000

- A cs\_locale (CS\_SET, CS\_LC\_TIME) call or a cs\_locale (CS\_SET, CS\_LC\_ALL) call resets date/time conversion information to the default settings for the specified national language.

See also

cs\_dt\_crack, cs\_locale

## cs\_loc\_alloc

Description Allocates a CS\_LOCALE structure.

Syntax CS\_RETCODE cs\_loc\_alloc(context, loc\_pointer)

```
CS_CONTENT    *context;
CS_LOCALE     **loc_pointer;
```

Parameters *context*  
A pointer to a CS\_CONTEXT structure.

*loc\_pointer*  
The address of a pointer variable. cs\_loc\_alloc sets \*loc\_pointer to the address of a newly allocated CS\_LOCALE structure.

Return value cs\_loc\_alloc returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

The most common reason for a cs\_loc\_alloc failure is a lack of adequate memory.

- Usage
- An Open Client and Open Server application can use a CS\_LOCALE structure to define custom localization values for a context, thread, connection, or data element. To define custom localization values, an application:
    - Calls cs\_loc\_alloc to allocate a CS\_LOCALE structure.
    - Calls cs\_locale (CS\_SET) to load the CS\_LOCALE with custom values.
    - Uses the CS\_LOCALE to set the CS\_LOC\_PROP property for a context or connection; calls srv\_thread\_props to set the SRV\_T\_LOCALE property for a thread; uses the CS\_LOCALE in a CS\_DATAFMT structure that describes a program variable; or uses the CS\_LOCALE as a parameter to an Open Client and Open Server routine.
    - Calls cs\_loc\_drop to drop the CS\_LOCALE.
  - Localization values define:
    - The language and character set to use for Open Client and Open Server and Adaptive Server Enterprise messages
    - How to represent dates and times

- The character set to use when converting data to and from character datatypes
- The collating sequence used to define the sort order used by `cs_stremp`

See also `cs_ctx_alloc`, `cs_loc_drop`, `cs_locale`

## cs\_loc\_drop

Description Deallocates a `CS_LOCALE` structure.

Syntax `CS_RETCODE cs_loc_drop(context, locale)`

```
CS_CONTEXT *context;
CS_LOCALE *locale;
```

Parameters

*context*

A pointer to the `CS_CONTEXT` structure that represents the context in which the `CS_LOCALE` was allocated.

*locale*

A pointer to a `CS_LOCALE` structure.

Return value

`cs_loc_drop` returns:

Returns	Indicates
<code>CS_SUCCEED</code>	The routine completed successfully.
<code>CS_FAIL</code>	The routine failed.

Usage

- A `CS_LOCALE` structure contains localization information.
- Once a `CS_LOCALE` structure has been deallocated, it cannot be used again. To allocate a new `CS_LOCALE` structure, an application can call `cs_loc_alloc`.
- An application should take care to ensure that it does not deallocate a `CS_LOCALE` structure that is still in use. A `CS_LOCALE` structure is considered to be in use if a `CS_DATAFMT` structure references it.
- An application can deallocate a `CS_LOCALE` structure after calling `cs_config` or `ct_con_props` to set the `CS_LOC_PROP` property for a context or connection. This is because `cs_config` and `ct_con_props` copy information from the user-supplied `CS_LOCALE` structure rather than setting up direct references to it.

See also `cs_loc_alloc`, `cs_locale`

## cs\_locale

**Description** Loads a CS\_LOCALE structure with localization values or retrieve the locale name previously used to load a CS\_LOCALE structure.

**Syntax** CS\_RETCODE cs\_locale(context, action, locale, type, buffer, buflen, outlen)

```
CS_CONTEXT    *context;
CS_INT        action;
CS_LOCALE     *locale;
CS_INT        type;
CS_CHAR       *buffer;
CS_INT        buflen;
CS_INT        *outlen;
```

**Parameters**

*context*

A pointer to the CS\_CONTEXT structure that represents the context in which the CS\_LOCALE was allocated.

*action*

One of the following symbolic values:

Value of action	cs_locale
CS_SET	Loads the CS_LOCALE with new localization values.
CS_GET	Retrieves the locale name that was used to load the CS_LOCALE.

*locale*

A pointer to a CS\_LOCALE structure. If *action* is CS\_SET, cs\_locale modifies this structure. If *action* is CS\_GET, cs\_locale examines the structure to determine the locale name that was previously used to load it.

*type*

One of the following symbolic values:

Value of type	Indicates
CS_LC_ALL	All types of localization information.  <b>Note</b> CS_LC_ALL is “set only”; that is, <i>action</i> must be CS_SET when <i>type</i> is CS_LC_ALL.
CS_LC_COLLATE	The collating sequence (also called “sort order”). Open Client uses a collating sequence when sorting and comparing character data.
CS_LC_CTYPE	The character set. Open Client uses a character set when it converts to or from character datatypes.
CS_LC_MESSAGE	The language and character set to use for Open Client and Open Server and Adaptive Server Enterprise error messages.
CS_LC_TIME	The language and character set to use when converting between datetime and character datatypes. CS_LC_TIME controls month names and abbreviations, datepart ordering, and whether the “am/pm” string is used.
CS_SYB_LANG, CS_SYB_CHARSET, CS_SYB_SORTORDER, CS_SYB_LANG_CHARSET	For information on these values, see “Using language, character set, and sort order names with cs_locale” on page 68.

**Warning!** Open Server application programmers must set *type* to CS\_LC\_ALL when configuring the CS\_LOCALE structure that applies to the Open Server application as a whole.

*buffer*

If *action* is CS\_SET, *buffer* points to a character string that represents a locale name, a character set name, a language name, a sort order name, or a language/character set pair.

If *action* is CS\_GET, *buffer* points to the space in which cs\_locale will place a locale name, a character set name, a language name, a sort order name, or a language/character set pair. On output, all names are null-terminated. The *buffer* must be long enough for the name plus a null terminator.

*buflen*

The length, in bytes, of *\*buffer*.

If *action* is CS\_SET and the value in *\*buffer* is null-terminated, pass *buflen* as CS\_NULLTERM.

*outlen*

A pointer to an integer variable.

*outlen* is not used if *action* is CS\_SET.

If *action* is CS\_GET and *outlen* is supplied, cs\_locale sets *\*outlen* to the length, in bytes, of the locale name.

If the name is larger than *buflen* bytes, an application can use the value of *\*outlen* to determine how many bytes are needed to hold the name.

If *action* is CS\_SET or if an application does not require return length information, it can pass *outlen* as NULL.

Return value

cs\_locale returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

Common reasons for a cs\_locale failure include:

- *action* is CS\_SET and the *\*buffer* locale name cannot be found in the Sybase locales file.
- *action* is CS\_GET and *buflen* indicates that the *\*buffer* data space is too small.
- Missing localization files.

Usage

---

**Note** cs\_locale's behavior depends on platform-specific configuration issues. You must read the localization chapter in the *Open Client and Open Server Configuration Guide for Microsoft Windows* and *Open Client and Open Server Configuration Guide for UNIX* to obtain a full understanding of Client-Library's localization mechanism. For a discussion of programming issues related to localization, see the *Open Client and Open Server International Developers Guide*.

---

- cs\_locale(CS\_SET) loads a CS\_LOCALE structure with localization values. cs\_locale(CS\_GET) retrieves current settings from the CS\_LOCALE structure.

- A *locale name* is a character string that represents a language/ character set/sort order combination. For example, the locale name “fr” might represent the language/character set/sort order combination “French, iso\_1, binary.”
  - Sybase predefines some locale names in the default locales file.
  - A System Administrator can define additional locale names and add them to the Sybase locales file. The *Open Client and Open Server Configuration Guide for Microsoft Windows* and *Open Client and Open Server Configuration Guide for UNIX* contains instructions for adding locale names.
- See the *Open Client and Open Server International Developers Guide*.

#### Loading a CS\_LOCALE structure

- An application needs to initialize, or “load,” a CS\_LOCALE before using it to define custom localization values for a context, connection, or data element.
- `cs_locale(CS_SET)` loads a CS\_LOCALE structure with localization values. Any localization value can be specified by giving a locale name. Character sets, languages, and sort orders can also be specified directly by name.
- When specifying a locale name, *buffer* must specify a name that corresponds to an entry in the Sybase locales file.

*buffer* can also be passed as NULL to specify the default locale. In this case, `cs_locale` searches the operating system for a locale name to use. If an appropriate locale name cannot be found in the operating system environment, `cs_locale` uses a platform-dependent default locale name.

The localization item(s) of interest are loaded based on the configuration of the locales file entry. See the *Open Client and Open Server Configuration Guide* for your platform.

- For instructions for directly specifying character set, language, or sort order names, see “Using language, character set, and sort order names with `cs_locale`” on page 68.
- After loading a CS\_LOCALE with custom values, an application can:
  - Call `cs_config` with *property* as CS\_LOC\_PROP to copy the custom localization values into a context structure.
  - Call `ct_con_props` with *property* as CS\_LOC\_PROP to copy the custom localization values into a connection structure.

- Supply the CS\_LOCALE as a parameter to a routine that accepts custom localization values (cs\_dt\_info, cs\_strcmp, cs\_time).
- Include the CS\_LOCALE in a CS\_DATAFMT structure describing a destination program variable (cs\_convert, ct\_bind).
- Because cs\_config copies locale information, an application can deallocate a CS\_LOCALE structure after calling cs\_config to set the CS\_LOC\_PROP property. Likewise, an application can deallocate a CS\_LOCALE structure after calling ct\_con\_props to set the CS\_LOC\_PROP property. If a CS\_DATAFMT structure uses a CS\_LOCALE structure, however, the application must not deallocate the CS\_LOCALE until the CS\_DATAFMT no longer references it.
- The first time a locale name is referenced, all localization information for the language, character set, and sort order that the locale name identifies is read from the environment and cached into *\*context*. If this locale name is referenced again, cs\_locale reads the information from the CS\_CONTEXT instead of the environment.

#### Retrieving a locale name

- An application can retrieve the locale name that was used to load a CS\_LOCALE by calling cs\_locale(CS\_GET) with *type* as the type of localization information of interest and *locale* as a pointer to the CS\_LOCALE structure.
- cs\_locale sets *\*buffer* to a null-terminated character string representing the locale name that was used to load the CS\_LOCALE.

#### Using language, character set, and sort order names with cs\_locale

- It is possible for an application to use language, character set, and sort order names, instead of a locale name, when calling cs\_locale.
- To use a language, character set, or sort order name, an application calls cs\_locale with *type* as CS\_SYB\_LANG, CS\_SYB\_CHARSET, CS\_SYB\_SORTORDER, or CS\_SYB\_LANG\_CHARSET. The following table summarizes cs\_locale parameters for these values of *type*:

**Table 2-10: Using language, character set, and sort order names with cs\_locale**

Value of type	action is	buffer is	cs_locale
CS_SYB_LANG	CS_SET	A pointer to a language name.	Loads the CS_LOCALE with the specified language information.
	CS_GET	A pointer to data space.	Places the current language name in <i>*buffer</i> . The name is null terminated.



Value of type	action is	buffer is	cs_locale
CS_SYB_CHARSET	CS_SET	A pointer to a character set name.	Loads the CS_LOCALE with the specified character set information.
	CS_GET	A pointer to data space.	Places the current character set name in <i>*buffer</i> . The name is null terminated.
CS_SYB_SORTORDER	CS_SET	A pointer to a sort order name.	Loads the CS_LOCALE with the specified sort order information.
	CS_GET	A pointer to data space.	Places the current sort order name in <i>*buffer</i> . The name is null terminated.
CS_SYB_LANG_CHARSET	CS_SET	A pointer to a string of the form <i>language_name</i> . <i>character_set_name</i> .	Loads the CS_LOCALE with the specified language and character set information.
	CS_GET	A pointer to data space.	Places a string of the form <i>language_name.character_set_name</i> in <i>*buffer</i> . The string is null terminated.

- The application must have previously loaded the CS\_LOCALE structure with consistent information by calling `cs_locale` with *type* as CS\_IC\_ALL.
- If an application specifies only a language name, then `cs_locale` uses the character set and sort order already specified in the preloaded CS\_LOCALE structure.  
If an application specifies only a character-set name, then `cs_locale` uses the language and sort order already specified in the preloaded CS\_LOCALE structure.  
If an application specifies only a sort-order name, then `cs_locale` uses the language and character set already specified in the preloaded CS\_LOCALE structure.  
If a language, character set, and sort-order combination is not valid, `cs_locale` returns CS\_FAIL.
- Valid language names correspond to subdirectories in the `$$SYBASE/locales` directory. Valid character-set names correspond to subdirectories in the `$$SYBASE/charsets` directory. Valid sort-order names for a character set correspond to file names, stripped of any suffix, in the `$$SYBASE/charsets/character_set_name` directory.
- If the required localization files for the requested language or character set do not exist, `cs_locale` returns CS\_FAIL.

See also `cs_loc_alloc`, `cs_loc_drop`

## cs\_locator

**Description** Retrieves information from a CS\_LOCATOR variable, such as prefetched data, the total length of the LOB in the server, or the character representation of the locator pointer.

**Syntax** CS\_RETCODE cs\_locator(ctx, action, locator, type, buffer, buflen, outlen)

```
CS_CONTEXT    *ctx;
CS_INT        action;
CS_LOCATOR    *locator;
CS_INT        type;
CS_VOID       *buffer;
CS_INT        buflen;
CS_INT        *outlen;
```

**Parameters**

*ctx*

A pointer to a CS\_CONTEXT structure.

*action*

Specifies whether to set or retrieve information. Currently, the only action allowed is CS\_GET.

*locator*

Pointer to the locator variable.

*type*

Type of information to retrieve or set. Symbolic values:

Value	Action	*buffer points to	Description
CS_LCTR_LOBLEN	CS_GET	CS_BIGINT	Retrieves the total length of the LOB data in the server.
CS_LCTR_LOCATOR	CS_GET	CS_CHAR	Retrieves the locator value as a character string.
CS_LCTR_PREFETCHLEN	CS_GET	CS_INT	Retrieves the length of the prefetched LOB data contained in the locator variable.
CS_LCTR_PREFETCHDATA	CS_GET	CS_CHAR	Retrieves the prefetched LOB data contained in the locator variable.
CS_LCTR_DATATYPE	CS_GET	CS_INT	Retrieves the locator type. Valid return types are CS_TEXTLOCATOR_TYPE, CS_IMAGELOCATOR_TYPE, and CS_UNITEXTLOCATOR_TYPE.

*buffer*

A pointer to the variable in which to store. Character data is NULL terminated.

*buflen*

*\*buffer* length, in bytes.

*outlen*

A pointer to a CS\_INT variable. If *outlen* is not NULL, `cs_locator()` sets *\*outlen* to the length, in bytes, of the data placed in *\*buffer*. If the data returned is a character data (for example, a prefetched data or locator string), the length returned in *\*outlen* includes the NULL terminator. If `cs_locator()` returns CS\_TRUNCATED and *outlen* is not NULL, `cs_locator()` returns the required buffer size in *\*outlen*.

## Return value

Return value	Meaning
CS_SUCCEED	The routine completed successfully.
CS_TRUNCATED	The result has been truncated because the buffer is too small.
CS_FAIL	The routine failed.

## Examples

Retrieves the LOB locator for a text value that needs to be truncated. See the *Open Client Client-Library/C Reference Manual* for more code examples.

```

CS_LOCATOR *lobloc;
CS_INT      prefetchsize;
CS_BOOL     boolval;
CS_INT      start, length;
CS_INT      outlen;
CS_CHAR     charbuf[1024];
CS_BIGINT   totallen;
...

/*
** Turn on option CS_LOBLOCATOR first and set the prefetchsize to 100.
*/

boolval = CS_TRUE;
ct_options(conn, CS_SET, CS_OPT_LOBLOCATOR, &boolval, CS_UNUSED, NULL);
prefetchsize = 100;
ct_options(conn, CS_SET, CS_OPT_LOBPREFETCHSIZE, \
           &prefetchsize, CS_UNUSED, NULL);

/*
** Allocate memory for the CS_LOCATOR.
*/
cs_locator_alloc(ctx, &lobloc);

```

```
/*
** Open a transaction and get the locator. The locator is only valid within a
** transaction.
*/
sprintf(cmdbuf, "begin transaction \
    select au_id, copy from pubs2..blurbs where au_id \
    like '486-29-%'");
ct_command(cmd, CS_LANG_CMD, cmdbuf , CS_NULLTERM, CS_UNUSED);
ct_send(cmd);

/*
** Process results.
*/
while ((results_ret = ct_results(...)) == CS_SUCCEED)
{
    ...
}

/*
** Bind the locator and fetch it.
*/
strcpy(prmfmt.name, "@locatorparam");
prmfmt.namelen = CS_NULLTERM;
prmfmt.datatype = CS_TEXTLOCATOR_TYPE;
prmfmt.maxlength = CS_UNUSED;
...

ct_bind(cmd, 1, &fmt, lobloc, NULL, &indicator);
ct_fetch(cmd, CS_UNUSED, CS_UNUSED, CS_UNUSED, &count);
}

/*
** Use the cs_locator() routine to retrieve data from the fetched locator.
** Get the prefetch length and the prefetch data.
*/
cs_locator(ctx, CS_GET, lobloc, CS_LCTR_PREFETCHLEN, \
    (CS_VOID *)&prefetchsize, sizeof(CS_INT), &outlen);

cs_locator(ctx, CS_GET, lobloc, CS_LCTR_PREFETCHDATA, \
    (CS_VOID *)charbuf, sizeof(charbuf), &outlen);

/*
** Retrieve the total length of the LOB data in the server for this
** locator.
*/
cs_locator(ctx, CS_GET, lobloc, CS_LCTR_LOBLEN, \
```

```
(CS_VOID *)&totalen,
sizeof(totalen), &outlen);

/*
** Use the retrieved locator to perform an action to the LOB, pointed to by
** this locator in the server.
**
** Get a substring from the text in the server, using a parameterized
** language command.
*/
start = 10;
length = 20;
sprintf(cmdbuf, "select return_lob(text, substring(@locatorparam, \
    start, length))");
ct_command(cmd, CS_LANG_CMD, cmdbuf, CS_NULLTERM, CS_UNUSED);

/*
** Set the format structure and call ct_param()
*/
strcpy(prmfmt.name, "@locatorparam");
prmfmt.namelen = CS_NULLTERM;
prmfmt.datatype = CS_TEXTLOCATOR_TYPE;
prmfmt.format = CS_FMT_UNUSED;
prmfmt.maxlength = CS_UNUSED;
prmfmt.status = CS_INPUTVALUE;

indicator = 0;
ct_param(cmd, &prmfmt, (CS_VOID *)lobloc, CS_UNUSED, indicator);

/*
** Send the locator commands to the server.
*/
ct_send(cmd);

/*
** Process results.
*/
while ((results_ret = ct_results(...)) == CS_SUCCEEDED)
{
    ...
}

/*
** Truncate the text to 20 bytes and commit the transaction.
*/
sprintf(cmdbuf, "truncate lob @locatorparam (length) \
```

```

        commit transaction");
ct_command(cmd, CS_LANG_CMD, cmdbuf, CS_NULLTERM, CS_UNUSED);
ct_param(cmd, &prfmt, (CS_VOID *)lobloc, CS_UNUSED, indicator);

ct_send(cmd);

/*
** Process results.
*/
while ((results_ret = ct_results(...)) == CS_SUCCEEDED)
{
    ...
}

/*
** The transaction is closed, deallocate the locator.
*/
cs_locator_drop(ctx, lobloc);

```

See also `cs_locator_alloc`, `cs_locator_drop`

## cs\_locator\_alloc

Description `Allocates a CS_LOCATOR datatype structure.`

Syntax `CS_RETCODE cs_locator_alloc(ctx, locator)`

```

CS_CONTEXT *ctx;
CS_LOCATOR **locator;

```

Parameters

*ctx*

A pointer to a CS\_CONTEXT structure.

*locator*

The address of a locator variable to be allocated. Sets *\*locator* to the address of a newly allocated CS\_LOCATOR structure.

Return value

Return value	Meaning
CS_SUCCEEDED	The routine completed successfully.
CS_FAIL	The routine failed.

See also `cs_locator`, `cs_locator_drop`

## cs\_locator\_drop

Description Deallocates a CS\_LOCATOR datatype structure.

Syntax CS\_RETCODE cs\_locator\_drop(ctx, locator)

```
CS_CONTEXT *ctx;
CS_LOCATOR *locator;
```

Parameters

*ctx*

A pointer to a CS\_CONTEXT structure.

*locator*

A pointer to the locator variable to be deallocated.

Return value

Return Value	Meaning
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

See also

cs\_locator, cs\_locator\_alloc

## cs\_manage\_convert

Description Installs or retrieves a user-defined character-set conversion routine.

Syntax CS\_RETCODE cs\_manage\_convert(context, action, srctype, srcname, srcnamelen, desttype, destname, destnamelen, conv\_multiplier, func)

```
CS_CONTEXT *context;
CS_INT action;
CS_INT srctype;
CS_CHAR *srcname;
CS_INT srcnamelen;
CS_INT desttype;
CS_CHAR *destname;
CS_INT destnamelen;
CS_INT *conv_multiplier;
CS_CONV_FUNC *func;
```

Parameters

*context*

A pointer to a CS\_CONTEXT structure.

*action*

One of the following symbolic values:

Value of action	cs_manage_convert
CS_SET	Installs a conversion routine and conversion multiplier for conversions between the indicated datatypes and character-set names.
CS_GET	Retrieves the current conversion routine and conversion multiplier for the indicated datatypes and character-set names.
CS_CLEAR	Clears the current conversion routine by replacing it with CS-Library's default conversion routine for the indicated datatypes and character-set names.

*srctype*

The datatype of the source data for the conversion. In the current version, *srctype* must be CS\_CHAR\_TYPE.

*srcname*

The name of the character set associated with *srctype*. This name must correspond to the name of a subdirectory within the *charsets* subdirectory of the Sybase installation directory.

*srcnamelen*

The length, in bytes, of *srcname*. If *srcname* is null-terminated, *srcnamelen* can be passed as CS\_NULLTERM.

*desttype*

The datatype of the destination data. In the current version, *desttype* must be CS\_CHAR\_TYPE.

*destname*

The name of the destination character set. This name must correspond to the name of a subdirectory within the *charsets* subdirectory of the Sybase installation directory.

*destnamelen*

The length, in bytes, of *destname*. If *destname* is null-terminated, *destnamelen* can be passed as CS\_NULLTERM.



*conv\_multiplier*

The address of a CS\_INT variable. When action is CS\_SET, pass *\*conv\_multiplier* as the conversion multiplier for the indicated character-set conversion. When action is CS\_GET, *\*conv\_multiplier* receives the conversion multiplier for the indicated character-set conversion. When action is CS\_CLEAR, pass *conv\_multiplier* as NULL.

See “Meaning of the conversion multiplier” on page 79 for a explanation of how applications use this number.

*func*

The address of a CS\_CONV\_FUNC variable, which itself is a pointer to a character-set conversion routine. “Defining a custom character set conversion routine” on page 79 describes the requirements for coding a custom character-set conversion routine.

If a conversion routine is being installed, *\*func* points to the conversion routine to be installed.

If a conversion routine is being retrieved, *cs\_manage\_convert* sets *\*func* to point to the currently installed character-set conversion routine for *srcname* to *destname* conversions, or to NULL if no custom routine is installed.

If a conversion routine is being cleared, pass *\*func* as NULL.

---

**Note** *func* represents a pointer to a pointer to a function. There are special requirements for passing this parameter. See the example code fragment under “Installing a custom character set conversion routine” on page 81.

---

## Return value

*cs\_manage\_convert* returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

The most common reason for a *cs\_manage\_convert* failure is an invalid parameter.

## Usage

- *cs\_manage\_convert* allows an application to install a custom character-set conversion routine that converts data from one character set to another.

### Character set conversion

- Client-Library, CS-Library, and Server-Library can all perform character-set conversion. Character-set conversion occurs when an application converts between any two character datatypes and associates different character sets with the source and destination.
  - In CS-Library, *cs\_convert* performs character-set conversion when converting between two character datatypes if the *destfmt* CS\_DATAFMT structure specifies (or defaults to) a different locale than the *srcfmt* CS\_DATAFMT structure.
  - In Client-Library, an application can request character-set conversion for fetched character data by binding the column to a character-datatype variable and passing a pointer to a CS\_LOCALE in *ct\_bind*'s *datafmt* that is different from the connection's locale (that is, the CS\_LOC\_PROP connection property).
  - In Server-Library, all character data sent to a client or received from a client is automatically converted between the client thread's character set and the Open Server character set.
- The character datatypes are CS\_CHAR, CS\_LONGCHAR, CS\_TEXT, CS\_UNITEXT, CS\_UNICHAR, CS\_VARCHAR and CS\_XML.
- *cs\_manage\_convert* requires an application to pass both *srctype* and *desttype* as CS\_CHAR\_TYPE. However, CS-Library, Client-Library, and Server-Library will call the conversion routine to convert between any two character-based types when the conversion locales specify the character sets associated with the conversion routine.
- The most common reason for installing a custom conversion routine is to improve performance by replacing an indirect conversion with a direct conversion.

A custom character-set conversion routine can improve performance in applications that rely on character-set conversions where CS-Library does not use direct character-set conversion. Indirect character-set conversion converts first to Unicode UTF-8, and then from Unicode UTF-8 to the destination character set. Applications that perform these conversions can improve performance by installing a custom routine that supports direct conversion.

For example, an Open Server application could install a custom routine to convert between ISO 8859-1 and EUC JIS. This direct conversion may be faster than the indirect conversion (ISO 8859-1 to/from Unicode UTF-8 to/from EUC JIS) that is supplied with Open Server.

- To find out whether a specific character conversion is direct or indirect, look in the source character set's conversion configuration file. If there is an entry for the destination character set, then the conversion is direct. Character set configuration files are described in the *Open Client and Open Server International Developers Guide*.
- See the *Open Client and Open Server International Developers Guide*.

#### Meaning of the conversion multiplier

- Applications must provide `cs_manage_convert` with a conversion multiplier for conversions between the indicated character sets.
- The value of the conversion multiplier equals the largest number of bytes in the destination result that can replace one source byte when converting between the indicated character sets.
- Applications can retrieve the conversion multiplier for a specific character-set conversion with `cs_conv_mult`. This number allows the application to determine the destination space needed for a conversion.

#### Defining a custom character set conversion routine

- A custom character-set conversion routine is defined as follows:

```

CS_RETCODE CS_PUBLIC
convfunc(context, srcfmt, srcdata,
          destfmt, destdata, destlen)
CS_CONTEXT      *context;
CS_DATAFMT     *srcfmt;
CS_VOID        *srcdata;
CS_DATAFMT     *destfmt;
CS_VOID        *destdata;
CS_INT         *destlen;

```

where:

- *context* is a pointer to a `CS_CONTEXT` structure.
- *srcfmt* is a pointer to a `CS_DATAFMT` structure describing the source data. *srcfmt*→*maxlength* describes the actual length, in bytes, of the source data.
- *srcdata* is a pointer to the source data.
- *destfmt* is a pointer to a `CS_DATAFMT` structure describing the destination data. *destfmt*→*maxlength* describes the actual length, in bytes, of the destination data space.
- *destdata* is a pointer to the destination data space.

*destlen* is a pointer to an integer. The conversion routine should set *\*destlen* to the number of bytes placed in *\*destdata*. If the routine writes a truncated result, it should set *\*destlen* as the number of bytes written before truncation.

---

**Note** When converting into a CS\_VARCHAR structure, the conversion routine should set both *\*destlen* and the CS\_VARCHAR's *len* field to the number of bytes written to the CS\_VARCHAR's *str* field.

---

- `cs_config` is the only CS-Library, Client-Library, or Server-Library function that can be called from within a custom conversion routine.
- A custom character-set conversion routine can return any of the values listed in Table 2-11.
  - If the conversion routine returns a value from Table 2-11 other than CS\_SUCCEED, then the application receives a Client-Library or CS-Library message that corresponds to the indicated error condition.
  - If the conversion routine returns a value that is not listed in Table 2-11, then the application receives an “Unknown return code” error message from Client-Library or CS-Library.

**Table 2-11: Return values for a custom conversion routine**

Return value	Indicates
CS_SUCCEED	Successful conversion.
CS_TRUNCATED	The conversion resulted in truncation.
CS_MEM_ERROR	A memory allocation failure has occurred.
CS_EBADXLT	Some characters could not be translated.
CS_ENOXLT	The requested translation is not supported.
CS_EDOMAIN	The source value is outside the domain of legal values for the datatype.
CS_EDIVZERO	Division by 0 is not allowed.
CS_EOVERFLOW	The conversion resulted in overflow.
CS_EUNDERFLOW	The conversion resulted in underflow.
CS_EPRECISION	The conversion resulted in loss of precision.
CS_ESCALE	An illegal scale value was encountered.
CS_ESYNTAX	The conversion resulted in a value which is not syntactically correct for the destination type.
CS_ESTYLE	The conversion operation was stopped due to a style error.

#### Installing a custom character set conversion routine

- The following code demonstrates calling `cs_manage_convert` to install a custom conversion routine. The code is based on the assumption that the installed routine has been defined correctly. (See “Defining a custom character set conversion routine” on page 79.) The program variable `p_conv_func` is used to pass the address of the conversion routine.

```
#define MULT_ISO_1_TO_EUCJIS 4
CS_CONV_FUNC p_conv_func;
CS_INT      conv_mult = MULT_ISO_1_TO_EUCJIS;

/*
** Install the routine charconv_iso_1_TO_eucjis() to convert
** character data from iso_1 character set to eucjis character
** set.
*/
p_conv_func = charconv_iso_1_TO_eucjis;
if (cs_manage_convert(context, CS_SET,
    CS_CHAR_TYPE, "iso_1", CS_NULLTERM,
    CS_CHAR_TYPE, "eucjis", CS_NULLTERM,
    &conv_mult, &p_conv_func )
    != CS_SUCCEED)
{
```

```
fprintf(stdout, "cs_manage_convert() failed!\n");
(CS_VOID)ct_exit(context, CS_FORCE_EXIT);
(CS_VOID)cs_ctx_drop(context);
exit(-1);
}
```

See also `cs_conv_mult`, `cs_convert`, `cs_locale`, `cs_set_convert`

## cs\_objects

Description Saves, retrieves, or clears objects and data associated with them.

Syntax `CS_RETCODE cs_objects(context, action, objname, objdata)`

```
CS_CONTEXT *context;
CS_INT action;
CS_OBJNAME *objname;
CS_OBJDATA *objdata;
```

Parameters

*context*

A pointer to a CS\_CONTEXT structure.

*action*

One of the following symbolic values:

Value of action	cs_objects
CS_SET	Saves an object.
CS_GET	Retrieves the first matching object that it finds.
CS_CLEAR	Clears all matching objects.

*objname*

A pointer to an object name structure. *\*objname* names and describes the object of interest. An object name structure is defined as follows:

```
/*
** CS_OBJNAME
*/
typedef struct _cs_objname
{
    CS_BOOL thinkexists;
    CS_INT object_type;
    CS_CHAR last_name[CS_MAX_CHAR];
    CS_INT lnlen;
    CS_CHAR first_name[CS_MAX_CHAR];
}
```

```
CS_INT      fnlen;  
CS_VOID     *scope;  
CS_INT      scopelen;  
CS_VOID     *thread;  
CS_INT      threadlen;  
} CS_OBJNAME;
```

The *object\_type*, *last\_name*, *first\_name*, *scope*, and *thread* fields form a five-part key that identifies a stored object (see “cs\_objects naming keys” on page 87). Table 2-12 describes the CS\_OBJNAME fields:

**Table 2-12: CS\_OBJNAME fields**

Field	Description	Notes
<i>thinkexists</i>	Indicates whether the application expects this object to exist.	The value of <i>thinkexists</i> affects the cs_objects return code. For more information, see the Return values.
<i>object_type</i>	The type of the object.	This field is the first part of a five-part key. <i>object_type</i> can be one of these values: <ul style="list-style-type: none"> <li>• CS_CONNECTNAME</li> <li>• CS_CURSORNAME</li> <li>• CS_STATEMENTNAME</li> <li>• CS_CURRENT_CONNECTION</li> <li>• CS_WILDCARD (matches any value)</li> <li>• A user-defined value. User-defined values must be &gt;= 100.</li> </ul>
<i>last_name</i>	The “last name” associated with the object of interest, if any.	This field is the second part of a five-part key.
<i>lflen</i>	The length, in bytes, of <i>last_name</i> .	Can be CS_NULLTERM to indicate a null-terminated <i>last_name</i> . Can be CS_UNUSED to indicate an internal “unused” value for <i>last_name</i> . For CS_GET and CS_CLEAR operations, can be CS_WILDCARD to match any <i>last_name</i> value.
<i>first_name</i>	The “first name” associated with the object of interest, if any.	This field is the third part of a five-part key.
<i>flen</i>	The length, in bytes, of <i>first_name</i> .	Can be CS_NULLTERM to indicate a null-terminated <i>first_name</i> . Can be CS_UNUSED to indicate an internal “unused” value for <i>first_name</i> . For CS_GET and CS_CLEAR operations, can be CS_WILDCARD to match any <i>first_name</i> value.
<i>scope</i>	Data that describes the scope of the object.	This field is the fourth part of a five-part key.



Field	Description	Notes
<i>scopelen</i>	The length, in bytes, of <i>scope</i> .	Can be CS_NULLTERM to indicate null-terminated <i>scope</i> data. Can be CS_UNUSED to indicate an internal “unused” value for <i>*scope</i> . For CS_GET and CS_CLEAR operations, can be CS_WILDCARD to match any <i>scope</i> value.
<i>thread</i>	Platform-specific data that is used to distinguish threads in a multi-threaded execution environment.	This field is the fifth part of a five-part key.
<i>threadlen</i>	The length, in bytes, of <i>thread</i> .	Can be CS_NULLTERM to indicate null-terminated <i>thread</i> data. Can be CS_UNUSED to indicate an internal “unused” value for <i>*thread</i> . For CS_GET and CS_CLEAR operations, can be CS_WILDCARD to match any <i>thread</i> value.

*objdata*

A pointer to an object data structure. *\*objdata* is the object of interest and any data associated with it. An object data structure is defined as follows:

```

/*
** CS_OBJDATA
*/
typedef struct _cs_objdata
{
    CS_BOOL          actuallyexists;
    CS_CONNECTION   *connection;
    CS_COMMAND      *command;
    CS_VOID         *buffer;
    CS_INT          buflen;
} CS_NAMEDATA;

```

Table 2-13 describes the CS\_OBJDATA fields:

**Table 2-13: CS\_OBJDATA fields**

Field	Description	Notes
<i>actuallyexists</i>	Indicates whether this object actually exists.	cs_objects sets <i>actuallyexists</i> to CS_TRUE if it finds a matching object. cs_objects sets <i>actuallyexists</i> to CS_FALSE if it does not find a matching object.
<i>connection</i>	A pointer to the CS_CONNECTION structure representing the connection in which the object exists.	
<i>command</i>	A pointer to the CS_COMMAND structure representing the command space with which the object is associated.	Can be NULL.
<i>buffer</i>	A pointer to data space. An application can use <i>buffer</i> to associate data with a saved object.	If <i>action</i> is CS_SET, <i>*buffer</i> contains the data to associate with the object. If <i>action</i> is CS_GET, cs_objects sets <i>*buffer</i> to the data associated with the object being retrieved.
<i>buflen</i>	The length, in bytes, of <i>*buffer</i> .	If <i>action</i> is CS_SET, <i>buflen</i> is the length of the data contained in <i>*buffer</i> . Can be CS_NULLTERM to indicate null-terminated data. Can be CS_UNUSED to indicate that there is no data associated with the object being saved. If <i>action</i> is CS_GET, <i>buflen</i> is the maximum capacity of <i>*buffer</i> . cs_objects overwrites <i>buflen</i> with the number of bytes copied to <i>*buffer</i> . If <i>buflen</i> is CS_UNUSED, cs_objects overwrites <i>buflen</i> with the length of the data but does not copy it to <i>*buffer</i> .

Return value

cs\_objects returns CS\_SUCCEED or CS\_FAIL depending on the values passed as *action* and *objname*→*thinkexists* (See Table 2-12 on page 84). Table 2-14 lists the return code for each combination:

**Table 2-14: cs\_objects return values**

cs_objects Called with	cs_objects returns			
	objname→t hinkexists	No match	Last-name match	Full match
CS_GET	CS_TRUE	CS_FAIL	CS_FAIL	CS_SUCCEEDED
CS_GET	CS_FALSE	CS_SUCCEEDED	CS_SUCCEEDED	CS_SUCCEEDED
CS_SET	CS_TRUE	CS_FAIL	CS_FAIL	CS_SUCCEEDED
CS_SET	CS_FALSE	CS_SUCCEEDED	CS_SUCCEEDED	CS_FAIL
CS_CLEAR	CS_TRUE	CS_FAIL	CS_FAIL	CS_SUCCEEDED
CS_CLEAR	CS_FALSE	CS_SUCCEEDED	CS_SUCCEEDED	CS_SUCCEEDED

Usage

**Table 2-15: Summary of cs\_objects parameter usage**

Value of action	objname is	objdata is
CS_SET	A five-part key for the object.	The object to save and any additional data to save with it.
CS_GET	A five-part key for the object.	Set to the retrieved object.
CS_CLEAR	A five-part key for the object.	CS_UNUSED.

- cs\_objects is useful in precompiler applications that need to retrieve structures and data items by name.

cs\_objects naming keys

- cs\_objects uses a five-part key, composed of the *object\_type*, *last\_name*, *first\_name*, *scope*, and *thread* fields of *\*objname* structure.
  - On CS\_SET operations, cs\_objects uses this key to store the *\*objdata* object.
  - On CS\_GET operations, cs\_objects uses this key to retrieve an object specification into *\*objdata*.
  - On CS\_CLEAR operations, cs\_objects clears all objects that match the key.
- Table 2-16 describes the rules that cs\_objects uses to determine whether or not key fields match:

**Table 2-16: cs\_objects key matching rules**

*objname key length is	Stored key length is CS_UNUSED	Stored key length is another legal value
CS_WILDCARD	Match	Match
CS_UNUSED	Match	No match
Another Legal Value	No match	Match, if the names match and have the same length.

- cs\_objects can achieve two types of matches:
  - “last-name matches,” in which the *last\_name*, *scope*, and *thread* parts of the key match.
  - “full matches,” in which all five parts of the key match.

The type of match that cs\_objects achieves, together with *action* and *objname*→*thinkexists*, determine its return code.

- On CS\_GET and CS\_CLEAR operations, an application may specify CS\_WILDCARD for one or more \*objname key fields:
  - On a CS\_GET operation, cs\_objects sets \*objdata to reflect the first matching object that it finds.
  - On a CS\_CLEAR operation, cs\_objects clears all matching objects.

#### Retrieving “Current Connection” objects

- If an application has previously saved a CS\_CURRENT\_CONNECTION object, it can retrieve the current connection by:
  - Calling cs\_objects with *objname*→*object\_type* as CS\_CURRENT\_CONNECTION, *lrlen* as CS\_UNUSED, and *flen* as CS\_UNUSED. cs\_objects ignores the *last\_name* and *first\_name* fields of *objname*, and sets *objdata*→*buffer* to the name of the current connection and *objdata*→*buflen* to the length of this name.
  - Calling cs\_objects with *objname*→*object\_type* as CS\_CONNECTNAME and *objname*→*last\_name* and *objname*→*lrlen* as the newly retrieved connection name and name length. cs\_objects sets *objdata* to the retrieved connection.

---

**Warning!** An application cannot call cs\_objects(CS\_SET) from within a completion callback routine.

---

See also

cs\_ctx\_alloc

## cs\_prop\_ssl\_localid

Description	Specifies the path to the local ID (certificates) file.
Syntax	<pre>typedef struct _cs_sslid {     CS_CHAR    *identity_file;     CS_CHAR    *identity_password; } CS_SSLIDENTITY</pre>
Parameters	<p><i>identity_file</i> provides a path to the file containing a digital certificate and the associated private key.</p> <p>CS_GET only returns the <i>identity_file</i> used, and only if it is set with CS_CONNECTION.</p> <p><i>identity_password</i> used to decrypt the private key.</p>

## cs\_set\_convert

Description	Installs or retrieves a user-defined conversion routine.
Syntax	<pre>CS_RETCODE cs_set_convert(context, action, srctype,                            desttype, func)</pre> <pre>CS_CONTEXT    *context; CS_INT        action; CS_INT        srctype; CS_INT        desttype; CS_CONV_FUNC  *func;</pre>
Parameters	<p><i>context</i> A pointer to a CS_CONTEXT structure. A CS_CONTEXT structure defines a Client-Library application context.</p> <p><i>action</i> One of the following symbolic values:</p>

Value of action	cs_set_convert
CS_SET	Installs a conversion routine.
CS_GET	Retrieves the current conversion routine of this type.
CS_CLEAR	Clears the current conversion routine by replacing it with CS-Library's default conversion routine of this type.

*srctype*

The datatype of the source data for the conversion.

*desttype*

The datatype of the destination data.

*func*

A pointer to a CS\_CONV\_FUNC variable, which is a pointer to a custom conversion function. “Defining a custom conversion routine” on page 91 describes the prototype for a custom conversion function.

If a conversion routine is being installed, *\*func* points to the conversion routine that you wish to install.

If a conversion routine is being retrieved, `cs_set_convert` sets *\*func* to point to the currently installed conversion routine.

If a conversion routine is being cleared, pass *\*func* as NULL.

---

**Note** *func* represents a pointer to a pointer to a function. There are special requirements for passing this parameter. See the example code fragment under “Installing a custom conversion routine” on page 93.

---

## Return value

`cs_set_convert` returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

The most common reason for a `cs_set_convert` failure is an invalid parameter.

## Usage

- An application can install custom conversion routines to convert data between:
  - Standard Open Client or Open Server datatypes
  - Standard and user-defined datatypes
  - User-defined datatypes
- Once a custom routine is installed for a particular conversion, the client/server libraries call the custom routine transparently whenever a conversion of the specified type is required.
- A Client-Library or Server-Library application creates a user-defined datatype by declaring it:

```
typedef CS_SMALLINT      EMPLOYEE_ID;
```

Because the Open Client routines `ct_bind` and `cs_convert` use integer symbolic constants to identify datatypes, it is often convenient for an application to declare a type constant for a user-defined type. User-defined types must be defined as greater than or equal to `CS_USERTYPE`:

```
#define EMPLOYEE_ID_TYPE    CS_USERTYPE + 1;
```

To enable conversion between a user-defined type and standard CS-Library datatypes, an application can call `cs_set_convert` to install user-defined conversion routines for the new type.

- To clear a custom conversion routine, an application can call `cs_set_convert` with *action* as `CS_CLEAR` and *func* as `NULL`. `cs_set_convert` replaces the custom routine with CS-Library's default conversion routine of the appropriate type, if any.
- An application can call `cs_setnull` to define null substitution values for a user-defined type.

#### Defining a custom conversion routine

- A custom conversion routine is defined as follows:

```
CS_RETCODE CS_PUBLIC
convfunc(context, srcfmt, srcdata,
          destfmt, destdata, destlen)
CS_CONTEXT      *context;
CS_DATAFMT     *srcfmt;
CS_VOID        *srcdata;
CS_DATAFMT     *destfmt;
CS_VOID        *destdata;
CS_INT         *destlen;
```

where:

- *context* is a pointer to a `CS_CONTEXT` structure.
- *srcfmt* is a pointer to a `CS_DATAFMT` structure describing the source data. *srcfmt*→*maxlength* describes the actual length, in bytes, of the source data.
- *srcdata* is a pointer to the source data.
- *destfmt* is a pointer to a `CS_DATAFMT` structure describing the destination data. *destfmt*→*maxlength* describes the actual length, in bytes, of the destination data space.
- *destdata* is a pointer to the destination data space.

- *destlen* is a pointer to an integer. If the conversion is successful, the custom routine should set *\*destlen* to the number of bytes placed in *\*destdata*.
- `cs_config` is the only CS-Library, Client-Library, or Server-Library function that can be called from within a custom conversion routine.
- The following table lists the legal return values for a custom conversion routine. CS-Library will raise a CS-Library error if any value other than `CS_SUCCEED` is returned. Other values should be returned to indicate error conditions, as described in Table 2-17.
  - If the conversion routine returns a value listed in Table 2-17 other than `CS_SUCCEED`, then the application receives a Client-Library or C S underscore -Library message that corresponds to the indicated error condition.
  - If the conversion routine returns a value that is not listed in Table 2-17, then the application receives an “Unknown return code” error message from Client-Library or CS-Library:



**Table 2-17: Return values for a custom conversion routine**

Return value	Indicates
CS_SUCCEED	Successful conversion.
CS_TRUNCATED	The conversion resulted in truncation.
CS_MEM_ERROR	A memory allocation failure has occurred.
CS_EBADXLT	Some characters could not be translated.
CS_ENOXLT	The requested translation is not supported.
CS_EDOMAIN	The source value is outside the domain of legal values for the datatype.
CS_EDIVZERO	Division by 0 is not allowed.
CS_EOVERFLOW	The conversion resulted in overflow.
CS_EUNDERFLOW	The conversion resulted in underflow.
CS_EPRECISION	The conversion resulted in loss of precision.
CS_ESCALE	An illegal scale value was encountered.
CS_ESYNTAX	The conversion resulted in a value which is not syntactically correct for the destination type.
CS_ESTYLE	The conversion operation was stopped due to a style error.

#### Installing a custom conversion routine

The following code demonstrates calling `cs_set_convert` to install a custom conversion routine, `MyConvert`, which converts from `CS_CHAR` to the user defined type indicated by `MY_USER_TYPE`. The code assumes that `MyConvert` is a custom conversion routine that has been defined correctly. (See “Defining a custom conversion routine” on page 91.) The program variable `myfunc` is used to pass the address of the conversion routine.

```
#define MY_USER_TYPE (CS_USER_TYPE + 2)

CS_CONV_FUNC p_conv_func;

p_conv_func = MyConvert;
if (cs_set_convert(context, CS_SET, CS_CHAR_TYPE, MY_USER_TYPE,
    &p_conv_func) != CS_SUCCEED)
{
    fprintf(stdout, "cs_set_convert(MY_USER_TYPE) failed!\n");
    (CS_VOID)ct_exit(context, CS_FORCE_EXIT);
    (CS_VOID)cs_ctx_drop(context);
    exit(1);
}
```

See also `cs_convert`, `cs_manage_convert`, `cs_setnull`, `ct_bind`

## cs\_setnull

**Description** Defines a null substitution value to be used when binding or converting NULL data.

**Syntax** CS\_RETCODE cs\_setnull(context, datafmt, buffer, buflen)

```
CS_CONTEXT    *context;
CS_DATAFMT    *datafmt;
CS_VOID       *buffer;
CS_INT        buflen;
```

**Parameters**

*context*

A pointer to a CS\_CONTEXT structure. cs\_setnull defines a null substitution value for this context.

*datafmt*

A pointer to a CS\_DATAFMT structure describing the datatype for which a null substitution value is being defined.

*buffer*

A pointer to the null substitution value. *\*buffer*'s datatype must match *datafmt->type*.

*buflen*

The length, in bytes, of *\*buffer*.

**Return value**

cs\_set\_null returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

Common reasons for a cs\_setnull failure include:

- A memory allocation error
- An invalid parameter
- If ANSI-style binds are in effect, CS-Library does not use null substitution values. To activate ANSI-style binds, an application sets the Client-Library property CS\_ANSI\_BINDS to CS\_TRUE.
- When ANSI-style binds are not in effect and source data for a conversion is NULL, CS-Library sets the destination data to the predefined null substitution value for that destination type. For example, converting a NULL value of any type to a CS\_CHAR destination results in an empty string.

**Usage**

- In a Client-Library application, null substitution values are defined at the context level. When a Client-Library connection is allocated, it picks up null substitution values from its parent context.
- When converting a NULL source value to a CS\_CHAR or CS\_BINARY destination variable, CS-Library first puts 0 bytes into the destination and then uses the *format* field of the CS\_DATAFMT structure that describes the destination to determine whether to pad or null-terminate.
- To reinstate CS-Library's original default null substitution value for a particular datatype, an application can call `cs_setnull` with *buffer* as NULL.
- CS-Library and Client-Library use the following default null substitution values:

**Table 2-18: Default null substitution values**

Destination type	Null substitution value
CS_BINARY_TYPE	Empty array
CS_VARBINARY_TYPE	Empty array
CS_BIT_TYPE	0
CS_CHAR_TYPE	Empty string
CS_VARCHAR_TYPE	Empty string
CS_DATE_TYPE	4 bytes of zeros
CS_TIME_TYPE	4 bytes of zeros
CS_BIGDATETIME_TYPE	8 bytes of zeros
CS_BIGTIME_TYPE	8 bytes of zeros
CS_DATETIME_TYPE	8 bytes of zeros
CS_DATETIME4_TYPE	4 bytes of zeros
CS_TINYINT_TYPE	0
CS_SMALLINT_TYPE	0
CS_INT_TYPE	0
CS_DECIMAL_TYPE	0.0 (with default scale and precision)
CS_NUMERIC_TYPE	0.0 (with default scale and precision)
CS_FLOAT_TYPE	0.0
CS_REAL_TYPE	0.0
CS_MONEY_TYPE	\$0.0
CS_MONEY4_TYPE	\$0.0
CS_BOUNDARY_TYPE	Empty string
CS_SENSITIVITY_TYPE	Empty string
CS_TEXT_TYPE	Empty string
CS_UNITEXT_TYPE	Empty string
CS_IMAGE_TYPE	Empty array
CS_XML_TYPE	Empty string

See also `cs_set_convert`, `cs_will_convert`

## cs\_snprintf

### Description

A common snprintf like function for all platforms, providing formatted output conversion. The result is always a NULL-terminated string.

### Syntax

```
void cs_snprintf(char *str, size_t size, const char *format, ...)
```

Parameters	<p><i>str</i> String into which the output is written to.</p> <p><i>size</i> Maximum number of bytes to write.</p> <p><i>format</i> Character string composed of zero or more conversion directives.</p>
Return value	None

## cs\_strbuild

Description	Constructs native language message strings.
Syntax	<pre>CS_RETCODE cs_strbuild(context, buffer, buflen,     resultlen, text, textlen     [, formats, formatlen]     [, arguments]);  CS_CONTEXT *context; CS_CHAR *buffer; CS_INT buflen; CS_INT *resultlen; CS_CHAR *text; CS_INT textlen; CS_CHAR *formats; /* Optional */ CS_INT formatlen; /* Optional */ &lt;optional arguments&gt;</pre>

Parameters	<p><i>context</i> A pointer to a CS_CONTEXT structure.</p> <p><i>buffer</i> A pointer to the space in which <code>cs_strbuild</code> places the finished message. Note that the finished message is not null-terminated. An application must use <i>resultlen</i> to determine the length of the message placed in <i>buffer</i>.</p> <p><i>buflen</i> The length, in bytes, of the <i>buffer</i> data space.</p> <p><i>resultlen</i> A pointer to an integer variable. <code>cs_strbuild</code> sets <i>resultlen</i> to the length, in bytes, of the string placed in <i>buffer</i>.</p>
------------	--

*text*

A pointer to the unfinished text of the message. The *\*text* string contains message text and placeholders for variables. A placeholder has the form *%integer!*, for example, *%1!*, *%2!*, and so forth. The integer indicates which argument to substitute for a particular placeholder. Arguments are numbered from left to right.

*textlen*

The length, in bytes, of *\*text*. If *\*text* is null-terminated, pass *textlen* as CS\_NULLTERM.

*formats*

A pointer to a string containing one sprintf-style format specifier for each place holder in the *\*text* string.

*formatlen*

The length, in bytes, of *\*formats*. If *\*formats* is null-terminated, pass *formatlen* as CS\_NULLTERM.

*arguments*

The values which will be converted to character according to the *\*formats* string and substituted into the *\*text* string to produce the message that is placed in *\*buffer*.

There must be one argument for each place holder. The first value corresponds to the first format and the *%1!* placeholder, the second value corresponds to the second format and the *%2!* placeholder, and so forth.

If insufficient arguments are supplied, cs\_strbuild generates unpredictable results.

If too many arguments are supplied, the excess arguments are ignored.

## Return value

cs\_str\_build returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

## Usage

- cs\_strbuild builds a printable native-language message string from a text containing place holders for values, a format string containing information on the types and appearances of the values, and a variable number of arguments that represent the values.

- Parameters in error messages can occur in different orders in different languages. `cs_strbuild` allows an application to construct error messages in a printf-like fashion to ensure easy translation of error messages from one language to another.

For example, consider an error message that informs the user of a misused keyword in a stored procedure. The message requires three arguments: the misused keyword, the line in which the keyword occurs, and the name of the stored procedure. In the U.S. English localization file, the message text appears as:

```
The keyword '%1!' is misused in line %2! of stored
procedure '%3!'.
```

In the Spanish localization file, the same message appears as:

```
En linea %2! de stored procedure '%3!', la palabra
'%1!' esta mal usado!
```

The `cs_strbuild` call for either of the above messages is:

```
cs_strbuild(context, &mybuffer, buflen,
            &resultlength, messagetext, CS_NULLTERM,
            "%s, %d, %s", CS_NULLTERM,
            keyword, linenum, sp_name);
```

The only difference is the content of *messagetext*.

- `cs_strbuild` format specifiers can be separated by other characters, or they can be adjacent to each other. This allows existing message strings in U.S. English to be used as format parameters. The first format specifier describes the %1! placeholder, the second describes the %2! placeholder, and so forth.

See also `cs_dt_crack`, `cs_dt_info`, `cs_locale`

## cs\_strcmp

Description	Compares two strings using a specified sort order.
Syntax	CS_RETCODE cs_strcmp(context, locale, type, str1, len1, str2, len2, result)
	CS_CONTEXT *context;
	CS_LOCALE *locale;
	CS_INT type;

```
CS_CHAR    *str1;
CS_INT     len1;
CS_CHAR    *str2;
CS_INTI    len2;
CS_INT     *result;
```

**Parameters***context*

A pointer to a CS\_CONTEXT structure.

*locale*

A pointer to a CS\_LOCALE structure. A CS\_LOCALE structure contains locale information, including the collating sequence that cs\_strcmp uses to define a sort order.

An application can call cs\_locale with *type* as CS\_LC\_COLLATE or CS\_SYB\_SORTORDER to change the collating sequence in a CS\_LOCALE structure.

*locale* can be NULL. If *locale* is NULL, cs\_strcmp uses whatever localization information is defined in the *context* CS\_CONTEXT structure. Localization information is always defined at the context level, because a CS\_CONTEXT picks up default localization information when it is allocated.

*type*

The type of comparison to perform.

If *type* is CS\_COMPARE, cs\_strcmp performs a lexicographic comparison.

If *type* is CS\_SORT, the values are compared as they would appear in a sorted list. It is possible for strings that are lexicographically equal to belong in different places in a sorted list.

*str1*

A pointer to the first string for the comparison.

*len1*

The length, in bytes, of *str1*. If *str1* is null-terminated, pass *len1* as CS\_NULLTERM.

*str2*

A pointer to the second string for the comparison.

*len2*

The length, in bytes, of *str2*. If *str2* is null-terminated, pass *len2* as CS\_NULLTERM.



*result*

A pointer to the result of the comparison. The following table lists the possible values for *\*result*:

Value of <i>*result</i>	Indicates
<0	<i>str1</i> is lexicographically less than <i>str2</i> , or <i>str1</i> appears before <i>str2</i> in a sorted list.
0	<i>str1</i> is lexicographically equal to <i>str1</i> , or <i>str1</i> is identical to <i>str2</i> .
>0	<i>str1</i> is lexicographically greater than <i>str2</i> , or <i>str1</i> appears after <i>str2</i> in a sorted list.

## Return value

`cs_strcmp` returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

## Usage

- `cs_strcmp` sets *\*result* to indicate the result of the comparison.
- Some languages contain strings that are lexicographically equal, according to a specific sort order, but contain different characters. Although the strings are lexicographically equal, there is a standard order used when placing them into a sorted list.

An application can use `cs_strcmp` to compare strings either lexicographically or how they appear in a sorted list. For example, given a sort order that specifies that uppercase characters appear before lowercase characters in a sorted list:

- The strings “ABC” and “abc” are lexicographically equal.  
A call to `cs_strcmp` that compares “ABC” (as *str1*) and “abc” as (*str2*) with *type* as CS\_COMPARE returns with *result* set to 0.
- “ABC” appears before “abc” in a sorted list.  
A call to `cs_strcmp` that compares “ABC” (as *str1*) and “abc” as (*str2*) with *type* as CS\_SORT returns with *result* set to a value less than 0.
- `cs_strcmp` determines which sort order to use by examining *\*locale*, (or *\*context*, if *locale* is NULL).
- To change the sort order in a CS\_LOCALE structure, an application calls `cs_locale` with *type* as CS\_LC\_COLLATE or CS\_SYB\_SORTORDER.

- To change the sort order in a CS\_CONTEXT structure, an application must first set up a CS\_LOCALE structure with the desired sort order and then call cs\_config to set the CS\_LOC\_PROP property for the context.

See also `cs_cmp`, `cs_locale`, `cs_config`

## cs\_strlcat

**Description** Safe string concatenation function. Appends at most *target\_size* - `strlen(target_str)` - 1 characters of *source\_str* to *target\_str*. The result is always a null terminated string, except when *source\_str* or *target\_str* are NULL, or *target\_size* is 0, or the string pointed to by *target\_str* is longer than *target\_size* bytes.

**Syntax** `CS_RETCODE cs_strlcat(target_str, source_str, target_size)`

```
CS_CHAR    *target_str;
CS_CHAR    *source_str;
CS_INT     *target_size;
```

**Parameters** *target\_str*  
The target string where source string is to be appended.

*source\_str*  
The source string to be appended.

*target\_size*  
Size of the target string.

**Return value**

- 0 if *source\_str* is NULL, *target\_str* is NULL, or *target\_size* is 0
- *target\_size* in case of an overflow
- `strlen(target_str) + strlen(source_str)` in all other cases

## cs\_strlcpy

**Description** Safe string copy function. Copies at most *target\_size*-1 characters from *source\_str* to *target\_str*, truncating if necessary. The result is always a null terminated string except when *source\_str* or *target\_str* are NULL, or *target\_size* is 0.

---

Syntax	CS_RETCODE cs_strncpy(target_str, source_str, target_size)
	CS_CHAR *target_str;
	CS_CHAR *source_str;
	CS_INT *target_size;
Parameters	<p><i>target_str</i> The target string where source string is to be copied.</p> <p><i>source_str</i> The source string to be copied.</p> <p><i>target_size</i> Size of the target string</p>
Return value	<ul style="list-style-type: none"> <li>• 0 if <i>source_str</i> is NULL, <i>target_str</i> is NULL, or <i>target_size</i> is 0.</li> <li>• <i>target_size</i> in case of an overflow.</li> <li>• <code>strlen(source_str)</code> in all other cases.</li> </ul>

## cs\_time

Description	Retrieves the current date and time.
Syntax	CS_RETCODE cs_time(context, locale, buffer, buflen, outlen, daterec)
	CS_CONTEXT *context;
	CS_LOCALE *locale;
	CS_VOID *buffer;
	CS_INT buflen;
	CS_INT *outlen;
	CS_DATAREC *daterec;
Parameters	<p><i>context</i> A pointer to a CS_CONTEXT structure.</p>

*locale*

A pointer to a CS\_LOCALE structure. A CS\_LOCALE structure contains locale information, including formatting information that *cs\_time* uses to create a current datetime string.

*locale* can be NULL. If *locale* is NULL, *cs\_time* uses whatever localization information is defined in the CS\_CONTEXT structure indicated by *context*. Localization information is always defined at the context level, because a CS\_CONTEXT picks up default localization information when it is allocated.

*buffer*

A pointer to the space in which *cs\_time* will place a character string representing the current date and time.

*buffer* is an optional parameter and can be passed as NULL. If *buffer* is NULL, *daterec* must be supplied.

*buflen*

The length, in bytes, of *\*buffer*.

If *buffer* is supplied and *buflen* indicates that *\*buffer* is not large enough to hold the current datetime string, *cs\_time* sets *\*outlen* to the length of the datetime string and returns CS\_FAIL.

If *buffer* is NULL, pass *buflen* as CS\_UNUSED.

*outlen*

A pointer to an integer variable.

*cs\_time* sets *\*outlen* to the length, in bytes, of the current datetime string.

If the string is larger than *buflen* bytes, an application can use the value of *\*outlen* to determine how many bytes are needed to hold the string.

If *buffer* is NULL, pass *outlen* as NULL.

If an application does not care about return length information, it can pass *outlen* as NULL.

*daterec*

A pointer to a CS\_DATEREC structure in which *cs\_time* will place the current date and time. Note that *cs\_time* does not set the *datemsecond* and *datetzone* fields of the CS\_DATEREC structure.

See *cs\_dt\_crack* in this chapter.

*daterec* is an optional parameter and can be passed as NULL. If *daterec* is NULL, *buffer* must be supplied.

Return value

cs\_time returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

Common reasons for a cs\_time failure include:

- An invalid parameter.
  - *buflen* indicates that the *\*buffer* data space is not large enough to hold the formatted datetime string.
- Usage
- cs\_time returns the current date and time either in character string format or in a CS\_DATEREC structure, or both.
  - cs\_time formats the date and time according to locale information contained in *\*context*.

See also

cs\_config, cs\_dt\_crack, cs\_dt\_info, cs\_locale

## cs\_validate\_cb

Description

A Client-Library callback routine, registered through ct\_callback.

Syntax

```
typedef struct _cs_sslcertfield
{
    CS_VOID    *value;
    CS_INT     field_id;
    CS_INT     length;
} CS_SSLCERT_FIELD;

typedef struct _cs_sslcert
{
    CS_INT field_count;
    CS_INT extension_count;
    CS_UINT start_date;
    CS_UINT end_date;
    CS_SSLCERT_FIELD *fieldptr;
    CS_SSLCERT_FIELD *extensionptr;
} CS_SSLCERT;

typedef CS_INT (CS_PUBLIC * CS_CERT_CB) PROTOTYPE ((
    CS_VOID    *user_data,
    CS_SSLCERT *certptr,
    CS_INT     cert_count,
    CS_INT     valid
));
```



Returns	Indicates
CS_FAIL	The routine failed.

## Examples

```

/*
** ex_display_column()
*/

CS_RETCODE CS_PUBLIC
ex_display_column(context, colfmt, data, datalength,
                 indicator)
CS_CONTEXT      *context;
CS_DATAFMT      *colfmt;
CS_VOID         *data;
CS_INT          datalength;
CS_SMALLINT     indicator;
{
    char          *null = "NULL";
    char          *nc   = "NO CONVERT";
    char          *cf   = "CONVERT FAILED";
    CS_DATAFMT    srcfmt;
    CS_DATAFMT    destfmt;
    CS_INT        olen;
    CS_CHAR       wbuf[MAX_CHAR_BUF];
    CS_BOOL       res;
    CS_INT        i;
    CS_INT        disp_len;

    if (indicator == CS_NULLDATA)
    {
        olen = strlen(null);
        strcpy(wbuf, null);
    }
    else
    {
        cs_will_convert(context, colfmt->datatype,
                        CS_CHAR_TYPE, &res);

        if (res != CS_TRUE)
        {
            olen = strlen(nc);
            strcpy(wbuf, nc);
        }
        else

```

```
    {
        srcfmt.datatype = colfmt->datatype;
        srcfmt.format    = colfmt->format;
        srcfmt.locale    = colfmt->locale;
        srcfmt.maxlength = datalength;

        destfmt.maxlength = MAX_CHAR_BUF;
        destfmt.datatype  = CS_CHAR_TYPE;
        destfmt.format    = CS_FMT_NULLTERM;
        destfmt.locale    = NULL;

        if (cs_convert(context, &srcfmt, data,
                       &destfmt, wbuf, &olen) != CS_SUCCEED)
        {
            olen = strlen(cf);
            strcpy(wbuf, cf);
        }
        else
        {
            /*
             ** output length include null
             ** termination
             */
            olen -= 1;
        }
    }
}
fprintf(stdout, "%s", wbuf);

disp_len = ex_display_dlen(colfmt);
for (i = 0; i < (disp_len - olen); i++)
{
    fputc(' ', stdout);
}

return CS_SUCCEED;
}
```

#### Usage

- cs\_will\_convert allows an application to determine whether cs\_convert or ct\_bind/ct\_fetch are capable of performing a specific conversion. When cs\_convert is called to perform a conversion that it does not support, it returns CS\_FAIL and generates a CS-Library error.



- `cs_convert` can convert between standard and user-defined datatypes. To enable these types of conversions, an application must install custom conversion routines through `cs_set_convert`. If a custom routine is supplied for a conversion, `cs_will_convert` indicates that the conversion is supported.

#### Datatype conversion chart

A chart listing the datatype conversions that `cs_convert` supports is included on the manual page for `cs_convert`. (See Table 2-3 on page 28.)

#### See also

`cs_convert`, `cs_set_convert`, `cs_setnull`



# Bulk-Library

This chapter introduces Bulk-Library:

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Overview of Bulk-Library	111
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## Overview of Bulk-Library

Bulk-Library/C provides routines that allow Client-Library and Server-Library applications to use the Adaptive Server Enterprise bulk-copy interface.

The Adaptive Server Enterprise bulk copy interface allows high-speed transfer of data between a client application's program variables and the server's database tables. It provides an alternative to the use of the SQL insert and select commands to transfer data.

Administrators can perform bulk copy using the bcp utility; programmers can use Bulk-Library to create customized bulk-copy tools. Bulk-Library also provides the necessary routines to enable bulk-copy support in an Open Server gateway application.

Bulk copy of encrypted columns is supported if Adaptive Server Enterprise supports encrypted columns.

---

**Note** The Bulk-Library/C routines are for use with Open Client Client-Library and Open Server Server-Library applications. DB-Library™ provides its own bulk-copy interface, which is documented in the *Open Client DB-Library/C Reference Manual*.

---

## Client-side and server-side routines

Bulk-Library contains client-side and server-side routines.

### Client-side Bulk-Library routines

Client-side routines allow Client-Library programmers to execute bulk-copy commands from their programs. Client-side routines allow a program to:

- Transmit bulk-copy data to the remote server for database table population
- Extract the contents of a database table into program memory

### Server-side Bulk-Library routines

Server-side routines are used with Open Server. Open Server programmers can use these routines together with the client-side routines to allow bulk-copy transfers through an Open Server gateway. A gateway server uses the client-side routines to obtain bulk-copy data from the remote server and server-side routines to forward the data to its own client. Any routine that requires a `SRV_PROC` (Open Server thread-control structure) pointer as an argument is a server-side routine.

The server-side Bulk-Library routines require the application to be linked with Server-Library and must be used together with the client-side routines.

## Header files

The header file *bkpublic.h* contains Bulk-Library definitions and is required in all application source files that contain calls to Bulk-Library routines.

Client-Library applications that call Bulk-Library routines need to include only *bkpublic.h*, since *bkpublic.h* includes *ctpublic.h*. No harm is done if the application includes both files.

Gateway Open Server applications that call Bulk-Library routines need to include *bkpublic.h* in addition to the other include files required by Server-Library. *bkpublic.h* does not include any Open Server header files.

## Linking with Bulk-Library

On most platforms, Bulk-Library is a separate library file and must be specified on the link line for the application. See the *Open Client and Open Server Programmers Supplement* for compiling and linking instructions on your platform.

## The CS\_BLKDESC structure

All bulk-copy operations performed with Bulk-Library calls require a CS\_BLKDESC structure. This structure is also called the *bulk-descriptor structure*. The bulk-descriptor structure is a hidden structure that controls a particular bulk-copy operation.

Applications allocate a bulk-descriptor structure with blk\_alloc on page 128 and free the bulk descriptor's memory with blk\_drop on page 151. The structure's internals are not documented, but the properties of the structure can be retrieved and modified with the blk\_props on page 159 routine.

All Bulk-Library routines except for blk\_alloc require a valid bulk-descriptor structure pointer as an input parameter.

The bulk-descriptor structure is considered a child structure of Client-Library's connection structure. Bulk-copy operations require the connection to interact with the remote server.

## Bulk-Library client programming

Client-side Bulk-Library routines provide bulk-copy functionality to Client-Library programs. A Client-Library programmer may find bulk-copy useful if the application under development must exchange data with a non-database application, load data into a new database, or move data from one database to another.

A Client-Library application can call Bulk-Library routines to copy data either into a database table or out from a database table.

- Bulk-copy-in operations move data from the client machine into a database table and are typically used for database table population. For bulk copies into the database, Bulk-Library transmits tabular data over the network in its “raw” form. Bulk copies into the database can be considerably faster than embedding the data in equivalent SQL insert statements.
- Bulk-copy-out operations move data from a database table to the client program’s memory space and are typically used for data extracts. For data extracts, bulk copy offers no performance advantage over the equivalent SQL select statements. However, the Bulk-Library interface may be more convenient for programmers.

---

**Note** Errors resulting from client-side Bulk-Library routines are reported as Client-Library errors. Applications should install a Client-Library message callback to handle these errors or handle them inline with `ct_diag`.

---

## Bulk-copy-in operations

An application can call Bulk-Library routines to copy data from program variables into a database table.

When copying into a database, the chief advantage of bulk copy over the SQL insert alternative is speed.

When copying data into a non-indexed table, the *high speed* version of bulk copy is used. Adaptive Server Enterprise performs no data logging during high-speed transfers. If the system fails before the transfer is complete, no new data will remain in the database. Because high-speed transfer affects the recoverability of the database, it is enabled only when the Adaptive Server Enterprise option `select into/bulkcopy` has been turned on. An application can call the Adaptive Server Enterprise system procedure `sp_dboption` to turn this option on or use the Client-Library connection property `CS_BULK_LOGIN`.

If the `select into/bulkcopy` option is not turned on and a user tries to copy data into a table that has no indexes, Adaptive Server Enterprise generates an error message.

After a bulk-copy operation is complete, the System Administrator should dump the database to ensure its future recoverability.

When copying data into an indexed table, a slower version of bulk copy is automatically used, and row inserts are logged.

## The bulk-copy-in process

A typical application follows these steps to perform a bulk-copy-in operation:

- 1 Initializes the application in the same way as for a Client-Library application and sets up Client-Library error handling. Bulk-Library reports errors generated by calls to client-side routines as Client-Library messages.
- 2 Allocates the connection structure to be used.
- 3 Calls `ct_con_props` to set the necessary properties to connect to the target server. In addition, the application must set the `CS_BULK_LOGIN` property to `CS_TRUE` to enable the connection to perform bulk copies.

---

**Note** Programmers can often tune the Tabular Data Stream™ (TDS) packet size to increase throughput. A packet size larger than the default usually increases performance. First, make sure that the Adaptive Server Enterprise is configured to accept a larger TDS packet size, then set the `CS_PACKET_SIZE` connection property in your application. See the *Adaptive Server Enterprise System Administration Guide* for details on increasing the allowable network packet size and the *Open Client Client-Library/C Reference Manual* for details on connection properties.

---

- 4 Calls `ct_connect` to open the connection.
- 5 Calls `blk_alloc` to allocate a bulk-descriptor structure.
- 6 Calls `blk_init` to initialize the bulk-copy operation.
- 7 For each column in the target table, the application:
  - (Optional) Calls `blk_describe`, which returns a target column's description, allowing the application determine the column's datatype or size.
  - (Optional) Calls `blk_default`, which returns a column's default value, if a default is defined by the table schema. An application can call `blk_bind` with `*datalen` as 0 to indicate that the bulk-copy-in operation should use a column's default value.
  - Calls `blk_bind` to bind the variable to the target column. If data for the column will be transferred using `blk_textxfer`, the application must call `blk_bind` with `buffer` as NULL.

Columns can be bound either to scalar variables or to arrays. When columns are bound to scalar variables, each call to `blk_rowxfer_mult` transfers column values for a single row from the bound variables into the database. For array binding, an array is bound to each column, and multiple rows are transferred by each call to `blk_rowxfer_mult`. In either case, the application also binds *indicator* and *datalen* variables to the column as well. These are used to indicate the condition of the data to be transferred.

The discussion in this chapter assumes that array binding is not in effect. See `blk_bind` in Chapter 4, “Bulk-Library Routines.”

#### 8 Transfers the data.

While data remains to be transferred, the application places data into the program variables that are bound to the table columns, then calls `blk_rowxfer_mult` to transfer the row.

Before each call to `blk_rowxfer_mult`, for each bound column, the application sets *datalen* and *indicator* values to specify what value should be inserted:

<b>datalen value</b>	<b>indicator value</b>	<b>Result</b>
> 0	Any (is ignored).	<code>blk_rowxfer_mult</code> reads <i>datalen</i> bytes from <i>buffer</i> as the column value.
0	0	The column's default value, if available, is inserted. If no default is available, NULL is inserted.
0	-1	NULL is inserted.

If the row contains columns whose data is being transferred in chunks, the application calls `blk_textxfer` in a loop for each column. Data being transferred via `blk_textxfer` must reside at the end of the row, following any bound columns.

The application can call `blk_done(CS_BLK_BATCH)`, if needed, to send a batch of rows. This call instructs the Adaptive Server Enterprise to permanently save all rows transferred since the application's last `blk_done` call.

#### 9 Calls `blk_done(CS_BLK_ALL)` to send the last batch of rows and indicate that the bulk-copy operation is complete.



10 Calls `blk_drop` to deallocate the bulk-descriptor structure.

---

**Note** An application can call `blk_bind` between calls to `blk_rowxfer_mult` to specify a different program variable address or length.

---

## Program structure for bulk-copy-in operations

Most applications use a program structure similar to the following pseudocode to perform a bulk-copy-in operation:

```

ct_con_props to set connection properties
ct_connect to open the connection
blk_alloc to allocate a CS_BLKDESC
blk_init to initiate the bulk copy

for each column
    (optional: blk_describe to get a description of
        the column)
    (optional: blk_default to get the column's default
        value)
    blk_bind to bind the column to a program
        variable, or to mark the column for transfer
        via blk_textxfer
endfor

while there's data to transfer
    if it's time to save a batch of rows
        blk_done(CS_BLK_BATCH)
    endif
    copy row values to program variables
    call blk_rowxfer_mult to transfer the row data

    if data is being transferred via blk_textxfer
        for each column to transfer
            while there's data for this column
                blk_textxfer to transfer a chunk of data
            endwhile
        endfor
    endif
endwhile
blk_done(CS_BLK_ALL)
blk_drop to deallocate the CS_BLKDESC

```

## Bulk-copy-out operations

The bulk-copy-out process reads rows from the server and places the column values into program variables.

### The bulk-copy-out process

A typical application follows these steps to perform a bulk-copy-out operation:

- 1 Calls `ct_con_props` to set the required properties to open the connection.
- 2 Calls `ct_connect` to open the connection.
- 3 Calls `blk_alloc` to allocate a bulk-descriptor structure.
- 4 For each column of interest, the application:
  - (Optional) Calls `blk_describe` to retrieve a column's description. This step is necessary if an application lacks information about a column's datatype or size.
  - (Optional) Calls `blk_bind` to bind a program variable to the source column. If the data for a column will be transferred via `blk_textxfer`, call `blk_bind` with *buffer* as NULL.

Columns can be bound either to scalar variables or to arrays. When columns are bound to scalar variables, each call to `blk_rowxfer_mult` transfers column values for a single row into the bound variables into the database. For array binding, an array is bound to each column, and multiple column values are transferred into each array by each call to `blk_rowxfer_mult`.

The discussion in this chapter assumes that array binding is not used. See `blk_bind` in Chapter 4, "Bulk-Library Routines"

- 5 Transfers the data by calling `blk_rowxfer_mult` in a loop:

The application calls `blk_rowxfer_mult` repeatedly to transfer each row to program variables until `blk_rowxfer_mult` returns `CS_END_DATA`.

If the row contains columns whose data is transferred in chunks, the application calls `blk_textxfer` in a loop for each column. Data being transferred via `blk_textxfer` must reside at the end of the row, following any bound columns.

For example, suppose an application bulk-copies columns 1, 3, 5, 7, and 9 and must call `blk_textxfer` to copy columns 7 and 9. The application calls `blk_bind` once for each column, passing `buffer` as `NULL` for columns 7 and 9. After calling `blk_rowxfer_mult` to transfer a row from the table, the application must call `blk_textxfer` in a loop to copy the data for column 7 and then call `blk_textxfer` in another loop to copy the data for column 9.

- 6 Calls `blk_done(CS_BLK_ALL)` to indicate that the bulk-copy operation is complete.
- 7 Calls `blk_drop` to deallocate the bulk-descriptor structure.

---

**Note** An application can call `blk_bind` between calls to `blk_rowxfer_mult` to specify different program variable address or length.

---

## Program structure for bulk-copy-out operations

Most applications use a program structure similar to the following pseudocode to perform a bulk-copy-out operation:

```

ct_con_props to set connection properties
ct_connect to open the connection
blk_alloc to allocate a CS_BLKDESC
blk_init to initiate the bulk copy
for each column of interest
    (optional: blk_describe to get a description of
        the column)
    blk_bind to either bind the column to a program
        variable or to indicate that blk_textxfer will
        be used to transfer data for the column.
endfor
while there's data to transfer
    call blk_rowxfer_mult to transfer the row data
    pull data from program variables to a permanent
        location, if desired.
    if data is being transferred via blk_textxfer
        for each column to transfer
            while there's data for this column
                blk_textxfer to transfer a chunk of data
            endwhile
        endfor
    endif
endwhile
blk_done(CS_BLK_ALL)
blk_drop to deallocate the CS_BLKDESC

```

## Copying to and from Secure Adaptive Server Enterprise

Each row in a Secure Adaptive Server Enterprise table has a sensitivity column, which contains the sensitivity label for the row. Secure Adaptive Server Enterprise uses sensitivity labels to mediate access to data.

When bulk copying into or from a Secure Adaptive Server Enterprise table, an application can choose whether or not to include the table's sensitivity column in the bulk-copy operation.

To include the sensitivity column, an application sets the `BLK_SENSITIVITY_LBL` property to `CS_TRUE`.

`BLK_SENSITIVITY_LBL` has a default value of `CS_FALSE`, which means that by default the sensitivity column is not included.

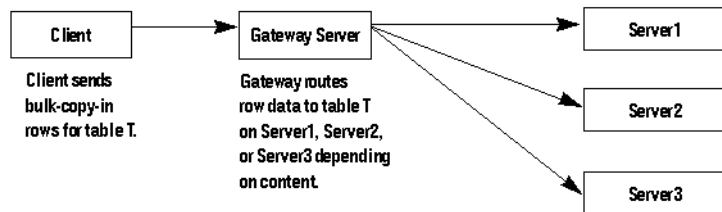
Users copying into the sensitivity column must have the `bcpin_labels_role` activated on Secure Adaptive Server Enterprise. If a user does not have this role, the bulk-copy operation fails. See your Secure Adaptive Server Enterprise documentation for more information on setting this role.

## Bulk-Library gateway programming

The server-side Bulk-Library routines are designed to be used in gateways in conjunction with the client-side routines. Note that Open Server applications must have available a valid `CS_CONNECTION` structure (set up with Client-Library calls) to call Bulk-Library routines.

Open Server provides bulk-copy functionality that allows gateway Open Server applications to filter bulk-copy data. A gateway Open Server can examine each row of a bulk-copy operation and implement any of the following filters:

- Discard certain rows while keeping others,
- Send all rows to the remote server, or
- Route bulk-copy requests to multiple remote servers based on the row content, as shown in the diagram below.

**Figure 3-1: Gateway routing bulk-copy requests**

A gateway's client can issue two types of bulk requests, a *TDS text/image insert request* or a *TDS bulk-copy request*. In the case of a TDS text/image insert, the client simply wishes to send a text or image stream. In the case of a TDS bulk-copy request, the client is actually initiating a bulk-copy request. In both cases, the request handling involves processing both language (SRV\_LANGUAGE) events and bulk (SRV\_BULK) events.

An Open Server application processes both requests using two event handlers: SRV\_LANGUAGE and SRV\_BULK. Inside the SRV\_LANGUAGE event handler, the application determines which kind of bulk request has been issued by the client and records this information internally. In addition, if the request is for bulk copy, the application allocates and initializes a bulk-descriptor structure. Inside the SRV\_BULK handler, the application retrieves the request type and then processes the data accordingly.

The discussion in this section assumes that the gateway application is intended to accept both bulk-copy insert requests and text/image insert requests. For a description of how to handle text/image insert commands only, see the “Text and Image” topics page in the *Open Server Server-Library/C Reference Manual*.

---

**Note** Bulk-Library reports errors resulting from calls to server-side routines as Server-Library errors. Applications that call server-side Bulk-Library routines should install a Server-Library error handler to receive notification of these errors.

---

## Inside the SRV\_LANGUAGE event handler

If you intend for your gateway application to handle either type of bulk request, you must code the SRV\_LANGUAGE event handler to parse for the phrase “insert bulk” or “writetext bulk.” These phrases indicate the following:

- The phrase “insert bulk” indicates the initiation of a bulk-copy request; the request handling will be started in the language handler and finished in the SRV\_BULK handler.
- The phrase “writetext bulk” indicates that the client will issue a stream of text or image bytes to be handled in the SRV\_BULK event handler.

### “Insert Bulk” requests

The text of an “insert bulk” language request looks like this:

```
insert bulk tablename [with nodescribe]
```

where “with *nodescribe*” is optional.

In response, the SRV\_LANGUAGE event handler should:

- 1 Record the bulk type internally by calling `srv_thread_props` with `cmd` set to `CS_SET`, `property` set to `SRV_T_BULKTYPE`, and `bufp` pointing to a value of `SRV_BULKLOAD`.
- 2 Continue parsing to extract the table name, which is an argument to the `blk_init` routine. The table name is in the form of “*database.owner.tablename*”, without slice information. If a slice is used for the bulk insert command, the colon and slice number must be removed from the table name.
- 3 Allocate a bulk-descriptor structure, `CS_BLKDESC`, with a call to `blk_alloc`.
- 4 Initialize the client half of the exchange with a call to `blk_init`.
- 5 If “with *nodescribe*” is specified, it means that this data is part of a batch, and the table into which the bulk data will be loaded has already been described. The application need not call `blk_srvinit` a second time.  
  
If “with *nodescribe*” is not specified, initialize the server half of the exchange with a call to `blk_srvinit`.

### “Writetext Bulk” requests

The text of a “writetext bulk” language request looks like this:

```
writetext bulk dbname.tblname.colname textptr
[timestamp=timestamp] [with log]
```

where the timestamp and logging indicator are optional.

In response, the SRV\_LANGUAGE event handler should:

- 1 Record the bulk type internally by calling `srv_thread_props` with `cmd` set to `CS_SET`, `property` set to `SRV_T_BULKTYPE`, and `bufp` pointing to a value of `SRV_TEXTLOAD`, `SRV_IMAGELOAD`, or `SRV_UNITEXTLOAD`.
- 2 Continue parsing to extract the object name, which is generally of the form “`dbname.tblname.colname`”. This name can then be stored in the `name` and `namelen` fields of a `CS_IODESC` structure, which can later be used in the `SRV_BULK` event handler as an argument to `ct_data_info`, if the data stream is being passed on to a server in a gateway application.
- 3 Continue parsing to extract the text pointer, which will appear as a large hexadecimal number. Once converted from a character string to an actual `CS_BINARY` value, the text pointer and its length are stored in the `textptr` and `textptrlen` fields of the `CS_IODESC` structure.
- 4 Continue parsing to extract the timestamp, which, if present, will appear as “`timestamp = large_hexadecimal_number`”. Once converted from a character string to an actual `CS_BINARY` value, the timestamp and its length can be stored in the `timestamp` and `timestamplen` fields of the `CS_IODESC` structure.
- 5 Finally, parse to extract the logging indicator, which, if present, will appear as “with log”. If this indicator is present, the `log_on_update` field of the `CS_IODESC` structure should be set to `CS_TRUE`.

## Inside the SRV\_BULK event handler

Inside the `SRV_BULK` event handler, the application must respond to the bulk request that triggered the handler. However, its response depends on which type of bulk request the client issued. The application retrieves the request type by calling `srv_thread_props` with `cmd` set to `CS_GET` and `property` set to `SRV_T_BULKTYPE`.

If the request type is `SRV_TEXTLOAD`, `SRV_IMAGELOAD`, or `SRV_UNITEXTLOAD`, the application reads the text or image data from the client in chunks, using the `srv_text_info` and `srv_get_text` routines. For details, see the “Text and Image” topics page in the *Open Server Server-Library/C Reference Manual*.

If the request type is `SRV_BULKLOAD`, the application processes the bulk-copy rows using a combination of client-side and server-side routines. To process the bulk-copy rows, the `SRV_BULK` event handler should:

- 1 Call `blk_rowalloc` to allocate a `CS_BLK_ROW` structure.  
The `CS_BLK_ROW` structure is a hidden structure that holds formatted bulk-copy rows sent from the client.
- 2 Call `blk_getrow` to retrieve the formatted row from the client. This call retrieves all column data except columns of type text, image, sensitivity, or boundary. The gateway can process these later. If the row contains text, image, sensitivity, or boundary data, `blk_getrow` returns `CS_BLK_HASTEXT`. Otherwise, it returns `CS_SUCCEED`. If there are no more rows, the bulk-copy operation is complete and `blk_getrow` returns `CS_END_DATA`.
- 3 If the gateway must examine the row content (for example, to route rows to particular remote servers or reject data), it calls `blk_colval` to examine the value of each column in the bulk row.
- 4 Call the client-side routine `blk_sendrow` to send the formatted rows to the remote server.
- 5 If an incoming bulk row contains text, image, sensitivity, or boundary data, the server portion of the gateway calls `blk_gettext` to retrieve the row’s text, image, sensitivity, or boundary portion. The handler calls the client-side routine `blk_sendtext` to send it on to the remote server.
- 6 Call `blk_rowdrop` to deallocate the `CS_BLK_ROW` structure allocated by `blk_rowalloc`.
- 7 Call the client-side routine `blk_done` to indicate that the batch or bulk-copy operation is complete.
- 8 Call `blk_drop` to deallocate the bulk-descriptor structure.



## Example

The Open Server sample program *ctos.c* includes code to process bulk-copy requests.

## Topics

### Expanded variable-length rows

In Adaptive Server 15.7, the maximum offset of a variable-length column for a data-only-locked (DOL) row has been expanded to 32767 bytes, which allows an Adaptive Server configured with a logical-page size greater than 8K to support wide, variable-length, DOL rows.

The Open Client and Open Server Bulk-Library 15.7 routines, used to populate Adaptive Server logical pages, support the extended DOL rows. This feature is automatically activated in Bulk-Library 15.7 and later, but must be enabled in Adaptive Server.

Databases that are configured for wide DOL rows can accept DOL rows sent from an application that uses Bulk-Library 15.5 or earlier. However, applications that use Bulk-Library 15.7 must not send wide DOL rows to Adaptive Server 15.5 or earlier, or to a database that expects DOL rows in the earlier-version format. Otherwise, one of these errors occur:

- BCP failed to create rows in target table. Column %1! would start at an offset over 8191 bytes; this starting location cannot be represented accurately in the table's (row) format.
- BCP failed to create rows in target table. Column %1! starts at an offset greater than %2! bytes; this starting location is not permitted by the current database configuration.

To correct the error:

- Change the locking scheme of the table from data-only-locked to allpages-locked.

- When connected to Adaptive Server 15.7 or later, enable the allow wide dol rows option in the target database. See Chapter 2, “Data Storage” in the Adaptive Server Enterprise *Performance and Tuning Series: Physical Database Tuning*.

## In-row and off-row LOB support

Bulk-Library version 15.7 supports in-row storage of text, image, and unitext large object (LOB) columns in Adaptive Server.

In Adaptive Server 15.7, LOB columns that are marked for in-row storage are stored in-row when there is enough space available in the row. Only bound LOB data can be written in-row. The bcp utility binds LOB data, thus sending in-row LOB data as applicable. See Chapter 21, "In-Row Off-Row LOB" in the *Adaptive Server Enterprise Transact-SQL Users Guide*.

## Nonmaterialized columns

Bulk-Library 15.7 can handle nonmaterialized columns in Adaptive Server 15.7. With this feature, you can use only Bulk-Library and bcp version 15.7 and later to bulk-copy-in data into Adaptive Server tables that are altered and contain nonmaterialized columns. Adaptive Server raises an error when you use earlier versions of bcp to bulk-copy-in data into nonmaterialized columns.

# Bulk-Library Routines

This chapter contains a reference page for each Bulk-Library routine.

<b>Routines</b>	<b>Description</b>	<b>Page</b>
blk_alloc	Allocates a CS_BLKDESC structure.	128
blk_bind	Binds a program variable and a database column.	130
blk_colval	A server-side routine, obtains the column value from a formatted bulk copy row.	142
blk_default	Retrieves a column's default value.	144
blk_describe	Retrieves a description of a database column.	145
blk_done	Allocates a CS_CONTEXT structure.	148
blk_drop	Deallocates a CS_BLKDESC structure.	151
blk_getrow	A server-side routine, retrieves and stores a formatted bulk copy row.	153
blk_gettext	A server-side routine, retrieves the text, image, sensitivity, or boundary portion of an incoming bulk copy formatted row.	154
blk_init	Initiates a bulk copy operation.	156
blk_props	Sets or retrieve bulk descriptor structure properties.	159
blk_rowalloc	A server-side routine, allocates space for a formatted bulk copy row.	166
blk_rowdrop	A server-side routine, frees space previously allocated for a formatted bulk copy row.	167
blk_rowxfer	Transfers one or more rows during a bulk copy operation without specifying or receiving a row count.	168
blk_rowxfer_mult	Transfers one or more rows during a bulk copy operation.	171
blk_sendrow	A server-side routine, sends a formatted bulk copy row obtained from blk_getrow.	176
blk_sendtext	A server-side routine sends text, image, sensitivity, or boundary data in a formatted bulk copy row obtained from blk_sendtext.	178
blk_srvcinit	A server-side routine, copies descriptions of server table columns to the client, if required.	179
blk_textxfer	Transfers a column's data in chunks during a bulk copy operation.	180

## blk\_alloc

Description Allocates a CS\_BLKDESC structure.

Syntax CS\_RETCODE blk\_alloc(connection, version, blk\_pointer)

```
CS_CONNECTION  *connection;
CS_INT          version;
CS_BLKDESC     **blk_pointer;
```

Parameters

*connection*

A pointer to a CS\_CONNECTION structure that has been allocated with ct\_con\_alloc and opened with ct\_connect. A CS\_CONNECTION structure contains information about a particular client/server connection.

The connection must not have any pending results.

*version*

The intended version of Bulk-Library behavior. During initialization, *version*'s value is checked for compatibility with Client-Library's version level. *version* can take the following values:

Value	Meaning	Compatible Client-Library version level(s)
BLK_VERSION_100	Version 10.0 behavior	CS_VERSION_110, CS_VERSION_100
BLK_VERSION_110	Version 11.0 behavior	Same as BLK_VERSION_100
BLK_VERSION_120	Version 12.0 behavior	Same as BLK_VERSION_100, 110
BLK_VERSION_125	Version 12.5 behavior	Same as BLK_VERSION_100, 110, 120
BLK_VERSION_150	Version 15.0 behavior	Same as BLK_VERSION_100, 110, 120, 125
BLK_VERSION_155	Version 15.5 behavior	Same as BLK_VERSION_100, 110, 120, 125, 150

**Note** BLK\_VERSION\_100 can only be used with Open Client and Open Server versions 11.x and higher, regardless of whether the context/ctlib is initialized to CS\_VERSION\_100 or CS\_VERSION\_110.

The application's Client-Library version level is determined by the call to ct\_init that initializes the connection's parent context structure.

*blk\_pointer*

The address of a pointer variable. `blk_alloc` sets *blk\_pointer* to the address of a newly allocated `CS_BLKDESC` structure.

In case of error, `blk_alloc` sets *blk\_pointer* to `NULL`.

Return value `blk_alloc` returns:

Returns	Indicates
<code>CS_SUCCEED</code>	The routine completed successfully.
<code>CS_FAIL</code>	The routine failed.

The most common reason for a `blk_alloc` failure is a lack of adequate memory.

## Examples

```

/*
** BulkCopyIn()
** Ex_tabname is globally defined.
*/
CS_STATIC CS_RETCODE
BulkCopyIn(connection)
CS_CONNECTION *connection;
{
    CS_BLKDESC *blkdesc;
    CS_DATAFMT datafmt; /* variable descriptions */
    Blk_Data *dptr; /* data for transfer */
    CS_INT datalen[5]; /* variable data length */
    CS_INT len;
    CS_INT numrows;

    /*
    ** Ready to start the bulk copy in now that all the
    ** connections have been made and have a table name.
    ** Start by getting the bulk descriptor and
    ** initializing.
    */
    if (blk_alloc(connection, BLK_VERSION_100, &blkdesc)
        != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_alloc() failed");
        return CS_FAIL;
    }
    if (blk_init(blkdesc, CS_BLK_IN,
                Ex_tabname, strlen(Ex_tabname)) == CS_FAIL)
    {
        ex_error("BulkCopyIn: blk_init() failed");
    }
}

```

```
        return CS_FAIL;
    }
    /*
    ** Bind the variables to the columns and send the rows,
    ** and then clean up.
    */
    ...CODE DELETED....

    return CS_SUCCEED;
}
```

- Usage
- A `CS_BLKDESC` structure, also called a *bulk-descriptor structure*, is the control structure for sending and receiving bulk-copy data. It is a hidden structure that contains information about a particular bulk-copy operation.
  - Before calling `blk_alloc`, an application must call the Client-Library routines `ct_con_alloc` and `ct_connect` to allocate a `CS_CONNECTION` structure and open the connection.
  - `blk_alloc` must be the first routine called in a bulk-copy operation.
  - Multiple `CS_BLKDESC` and `CS_COMMAND` structures can be allocated on a connection, but only one `CS_BLKDESC` or `CS_COMMAND` structure can be active at a time. See `blk_init` on page 156 in this chapter.
  - To deallocate a `CS_BLKDESC` structure, an application can call `blk_drop`.

See also `blk_drop`, `blk_init`, `ct_con_alloc`, `ct_connect`

## blk\_bind

Description Bind a program variable to a database column.

Syntax `CS_RETCODE blk_bind(blkdesc, colnum, datafmt, buffer, datalen, indicator)`

```
CS_BLKDESC    *blkdesc;
CS_INT        colnum;
CS_DATAFMT    *datafmt;
CS_VOID       *buffer;
CS_INT        *datalen;
CS_SMALLINT   *indicator;
```

Parameters *blkdesc*

A pointer to the `CS_BLKDESC` that is serving as a control block for the bulk-copy operation. `blk_alloc` allocates a `CS_BLKDESC` structure.

*colnum*

The number of the column to bind to the program variable. The first column in a table is column number 1, the second is number 2, and so forth. Only visible columns are counted.

---

**Note** Setting the `ct_options` parameter to `CS_OPT_HIDE_VCC` or `CS_OPT_SHOW_FI` influences which columns are visible.

If `CS_OPT_HIDE_VCC` is set to `CS_TRUE`, Virtual Computed Columns (VCC) are not visible and not represented by column numbers in `blk_bind`. Similarly, if `CS_OPT_SHOW_FI` remains as `CS_FALSE`, Functional Indexes (FI) are not visible and also not represented by column numbers in `blk_bind`.

See the *Open Client Client-Library/C Reference Manual*.

---

*datafmt*

A pointer to the `CS_DATAFMT` structure that describes the program variable to bind to the column.

Table 4-1 lists the fields in *\*datafmt* that are used by `blk_bind` and contains general information about the fields. `blk_bind` ignores fields that it does not use:

**Table 4-1: Fields in the CS\_DATAFMT structure for blk\_bind**

Field name	When used	Sets the field to
<i>name</i>	Not used.	Not applicable.
<i>namelen</i>	Not used.	Not applicable.
<i>datatype</i>	Always.	<p>A type constant (CS_XXX_TYPE) representing the datatype of the program variable.</p> <p>All type constants listed on the “Types” topics page in the <i>Open Client Client-Library/C Reference Manual</i> are valid.</p> <p>Open Client user-defined types are not valid.</p> <p>blk_bind supports a wide range of type conversions, so <i>datatype</i> can be different from the column’s type. For instance, by specifying a variable type of CS_FLOAT_TYPE, a <i>money</i> column can be bound to a CS_FLOAT program variable. blk_rowxfer_mult on page 171 or blk_rowxfer on page 168 perform appropriate conversions when transferring data. For a list of the data conversions provided by Client-Library, see cs_convert on page 25 in Chapter 2, “CS-Library Routines.”</p> <p>If <i>datatype</i> is CS_BOUNDARY_TYPE or CS_SENSITIVITY_TYPE, the <i>*buffer</i> program variable must be of type CS_CHAR.</p>
<i>format</i>	When binding to character or binary-type destination variables during copy-out operations; otherwise, CS_FMT_UNUSED.	<p>A bit-mask of the following destination types and related symbols:</p> <ul style="list-style-type: none"> <li>• For character and text destination types: <ul style="list-style-type: none"> <li>• CS_FMT_NULLTERM to null-terminate data.</li> <li>• CS_FMT_PADBLANK to pad to full variable length with spaces.</li> </ul> </li> <li>• For character, binary, text, and image destination types: <ul style="list-style-type: none"> <li>• CS_FMT_PADNULL to pad to full variable length with nulls.</li> </ul> </li> <li>• For any destination type: <ul style="list-style-type: none"> <li>• CS_FMT_UNUSED if no format information is provided.</li> </ul> </li> <li>• When using array binding, the only format flag for bulk-copy-in operations is CS_BLK_ARRAY_MAXLEN. See “Array binding” on page 141.</li> </ul>



Field name	When used	Sets the field to
<i>maxlength</i>	When binding to a variable length datatype. When binding to a fixed-length datatype, <i>maxlength</i> is ignored.	The maximum length of the <i>*buffer</i> program variable. When binding character or binary variables, <i>maxlength</i> must describe the total maximum length of the program variable, including any space required for special terminating bytes, such as a null terminator. During a bulk-copy-in operation, <i>maxlength</i> specifies the maximum length of the data that will be copied from the <i>*buffer</i> program variable. During a bulk-copy-out operation, <i>maxlength</i> is the length of the <i>*buffer</i> program variable.
<i>scale</i>	Only when binding to numeric or decimal variables.	The scale of the program variable. If the source data is the same type as the destination, then <i>scale</i> can be set to CS_SRC_VALUE to indicate that the destination should pick up its value for <i>scale</i> from the source data. <i>scale</i> must be less than or equal to <i>precision</i> .
<i>precision</i>	Only when binding numeric or decimal destinations.	The precision of the program variable. If the source data is the same type as the destination, then <i>precision</i> can be set to CS_SRC_VALUE to indicate that the destination should pick up its value for <i>precision</i> from the source data. <i>precision</i> must be greater than or equal to <i>scale</i> .
<i>status</i>	Not used.	Not applicable.

Field name	When used	Sets the field to
<i>count</i>	Always.	<p><i>count</i> is the number of rows to transfer per <code>blk_rowxfer_mult</code> on page 171 or <code>blk_rowxfer</code> on page 168 call. If <i>count</i> is greater than 1, array binding is considered to be in effect.</p> <p>During a bulk-copy-out operation, if <i>count</i> is larger than the number of available rows, only the available rows are copied.</p> <p><i>count</i> must have the same value for all columns being transferred, with one exception: An application can intermix counts of 0 and 1. This is because when <i>count</i> is 0, 1 row is transferred.</p>
<i>usertype</i>	Not used.	Not applicable.
<i>locale</i>	If supplied, <i>locale</i> is used. Otherwise, default localization applies.	A pointer to a CS_LOCALE structure containing locale information for the <i>*buffer</i> program variable.

*buffer*

The address of the program variable to be bound to the column specified by *colnum*.

For a bulk-copy-in operations, *\*buffer* is the program variable from which `blk_rowxfer_mult` copies the data.

For bulk-copy-out operations, *buffer\** is the program variable in which `blk_rowxfer_mult` places the copied data. If *datafmt*→*maxlength* indicates that *\*buffer* is not large enough to hold the copied data, `blk_rowxfer_mult` truncates the data at row transfer time. If this occurs, Bulk-Library sets *\*indicator* to the actual length of the available data.

A NULL *buffer* indicates that data for the column will be transferred using the `blk_textxfer` routine.

*datalen*

A pointer to the length, in bytes, of the *\*buffer* data.

For bulk-copy-in operations:

- If *\*buffer* is not NULL, *\*datalen* represents the actual length of the data contained in the *\*buffer* program variable. An application must set this length before calling `blk_rowxfer_mult` or `blk_rowxfer` to transfer rows. In case of variable-length data, the length may be different for each row. If the data is fixed-length, *\*datalen* can be `CS_UNUSED`, except for array binding. If *\*datalen* is 0, the value of *\*indicator* is used to determine whether the column's default value or a NULL should be inserted. See Table 4-2 on page 139 for details.
- If *\*buffer* is NULL (indicating that the data will be transferred with `blk_textxfer`), *\*datalen* indicates the total length of the value to be transferred.

For bulk-copy-out operations:

- *\*datalen* represents the actual length of the data copied to *\*buffer*. `blk_rowxfer_mult` or `blk_rowxfer` sets *\*datalen* each time it is called to transfer a row.
- Since `blk_rowxfer_mult` or `blk_rowxfer` sets *datalen* each time it is called to transfer a row, the *datalen* parameter must remain local to the function calling `blk_bind()` and `blk_rowxfer()`, or `blk_rowxfer_mult()`. Failure to do so causes invalid results.

*indicator*

A pointer to a `CS_INT` variable, or for array binding, an array of `CS_INT`. At row-transfer time, `blk_rowxfer_mult` or `blk_rowxfer` read the indicator's contents to determine certain conditions about the bulk-copy data.

## Return value

`blk_bind` returns:

Returns	Indicates
<code>CS_SUCCEED</code>	The routine completed successfully.
<code>CS_FAIL</code>	The routine failed.

`blk_bind` returns `CS_FAIL` if the application has not called `blk_init` to initialize the bulk-copy operation.

## Examples

```
/*
** BulkCopyIn()
** BLKDATA and DATA_END are defined in the bulk copy
```

```
** example program.
*/

CS_STATIC CS_RETCODE

BulkCopyIn(connection)
CS_CONNECTION *connection;
{
    CS_BLKDESC *blkdesc;
    CS_DATAFMT datafmt; /* variable descriptions */
    Blk_Data *dptr; /* data for transfer */
    CS_INT datalen[5]; /* variable data length */
    CS_INT len;
    CS_INT numrows;

    /*
    ** Ready to start the bulk copy in now that all the
    ** connections have been made and have a table name.
    ** Start by getting the bulk descriptor initializing.
    */
    ...CODE DELETED....

    /*
    ** Bind the variables to the columns and
    ** transfer the data.
    */
    datafmt.locale = 0;
    datafmt.count = 1;
    dptr = BLKDATA;
    while (dptr->pub_id != DATA_END)
    {
        datafmt.datatype = CS_INT_TYPE;
        datafmt.maxlength = sizeof(CS_INT);
        datalen[0] = CS_UNUSED;

        if (blk_bind(blkdesc, 1, &datafmt, &dptr->pub_id,
                    &datalen[0], NULL) != CS_SUCCEED)
        {
            ex_error("BulkCopyIn: blk_bind(1) failed");
            return CS_FAIL;
        }
        datafmt.datatype = CS_CHAR_TYPE;
        datafmt.maxlength = MAX_PUBNAME - 1;
        datalen[1] = strlen(dptr->pub_name);
        if (blk_bind(blkdesc, 2, &datafmt, dptr->pub_name,
                    &datalen[1], NULL) != CS_SUCCEED)
```

```

    {
        ex_error("BulkCopyIn: blk_bind(2) failed");
        return CS_FAIL;
    }
    datafmt.maxlength = MAX_PUBCITY - 1;
    datalen[2] = strlen(dptra->pub_city);
    if (blk_bind(blkdesc, 3, &datafmt, dptra->pub_city,
        &datalen[2], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(3) failed");
        return CS_FAIL;
    }
    datafmt.maxlength = MAX_PUBST - 1;
    datalen[3] = strlen(dptra->pub_st);
    if (blk_bind(blkdesc, 4, &datafmt, dptra->pub_st,
        &datalen[3], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(4) failed");
        return CS_FAIL;
    }
    datafmt.maxlength = MAX_BIO - 1;
    datalen[4] = strlen((char *)dptra->pub_bio);
    if (blk_bind(blkdesc, 5, &datafmt, dptra->pub_bio,
        &datalen[4], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(5) failed");
        return CS_FAIL;
    }
    if (blk_rowxfer (blkdesc) == CS_FAIL)
    {
        ex_error("BulkCopyIn: blk_rowxfer() failed");
        return CS_FAIL;
    }
    dptra++;
}

/* Mark the operation complete and then clean up */
...CODE DELETED.....

return CS_SUCCEED;
}

```

**Usage**

- blk\_bind is a client-side routine.

- `blk_bind` binds program variables to table columns in the database. Once variables are bound, subsequent calls to `blk_rowxfer_mult` copy row data between the database and the bound variables. The copy direction is determined by the application's earlier call to `blk_init`.
- When copying into a database, an application must call `blk_bind` once for each column in the database table. When copying out, an application need not call `blk_bind` for columns in which it has no interest.
- To indicate that a column value will be transferred using `blk_textxfer`, an application calls `blk_bind` with *buffer* as NULL. A typical application will use `blk_textxfer` to transfer large text or image values.

If a text, image, boundary, or sensitivity datatype column is marked for transfer using `blk_textxfer`, all subsequent columns of these types must also be marked for transfer using `blk_textxfer`. For example, an application cannot mark the first text column in a row for transfer using `blk_textxfer` and then bind a subsequent text column to a program variable.

- An application can call `blk_bind` in between calls to `blk_rowxfer_mult` to reflect changes in a variable's address or length. If an application calls `blk_bind` multiple times for a single column or variable, only the last binding takes effect.
- An application can call `blk_describe` to initialize a `CS_DATAFMT` structure that describes the format of a particular column.

*blk\_bind* for bulk-copy-in operations

Table 4-2 summarizes `blk_bind` usage when used for bulk-copy-in operations. For information on *datafmt* fields, see Table 4-1 on page 132.

**Table 4-2: blk\_bind parameter values for bulk copy in**

When calling blk_bind to	buffer is	datalen is	*indicator is
Bind to a scalar or array variable from which blk_rowxfer_mult will read column values	The address of a program variable or array	<p>A pointer to a variable or array that indicates the length of the values to be read from <i>*buffer</i>.</p> <ul style="list-style-type: none"> <li>If <i>*datalen</i> is greater than 0, <i>*datalen</i> values are read from <i>*buffer</i> and sent as the column value.</li> <li>When <i>*datalen</i> is 0, the value of <i>*indicator</i> is used to determine whether the column's default value (if any) or NULL should be inserted.</li> </ul>	<p>The address of a variable or array that supplies indicator values for the column.</p> <p><i>*indicator</i> is only considered when <i>*datalen</i> is 0:</p> <ul style="list-style-type: none"> <li>If <i>*indicator</i> is 0, the column's default value (if available) is inserted. If no default value is available, a NULL is inserted.</li> <li>If <i>*indicator</i> is -1, NULL is always inserted.</li> </ul>
Indicate that a column value will be transferred using blk_textxfer	NULL	<p>The total length of the data that will be sent using blk_textxfer.</p> <p>In this case, <i>datafmt-&gt;maxlength</i> is ignored.</p>	Ignored.

When a Bulk-Library application calls blk\_bind in a bulk-copy-in operation the *buffer*, *datalen*, and *indicator* pointers passed to blk\_bind are recorded. The data at those locations must remain valid until it is read during the call to blk\_rowxfer or blk\_rowxfer\_mult.

*blk\_bind* for Bulk-Copy-Out operations

Table 4-3 summarizes blk\_bind usage when used for bulk-copy-out operations. For information on *datafmt* fields, see Table 4-1 on page 132.

Table 4-3: blk\_bind parameter values for bulk copy out

When calling blk_bind to	buffer is	*datalen is	*indicator is
Bind to a scalar or array variable into which blk_rowxfer_mult will write column values	The address of a program variable or array	A pointer to a variable or to a CS_INT variable for an array, where blk_rowxfer_mult on page 171 places the length of the values written to <i>*buffer</i> .	The address of a variable or array that supplies indicator values for the column.  blk_rowxfer_mult sets <i>*indicator</i> as follows: <ul style="list-style-type: none"> <li>• -1 indicates the data is null.</li> <li>• 0 indicates good data.</li> <li>• A value greater than 0 indicates truncation occurred. The value is the actual length of the available data.</li> </ul>
Indicate that a column value will be transferred using blk_textxfer	NULL	Ignored.  In this case, <i>datafmt</i> → <i>maxlength</i> represents the length of the <i>*buffer</i> data space.	Ignored.

#### Specifying Null values for Bulk Copy into the database

- When copying in, an application can instruct blk\_rowxfer\_mult to use a column's default value by setting *\*datalen* to 0 and *\*indicator* to 0 before calling blk\_rowxfer\_mult. If no default value is defined for the column, blk\_rowxfer\_mult inserts a NULL value.
- To instruct blk\_rowxfer\_mult to insert a NULL regardless of a column's default value, set *\*datalen* to 0 and *\*indicator* to -1 before calling blk\_rowxfer\_mult.

#### Clearing bindings

- To clear a binding, call blk\_bind with *buffer*, *datafmt*, *datalen*, and *indicator* as NULL. Otherwise, bindings remain in effect until an application calls blk\_done with *type* as CS\_BLK\_ALL to indicate that the bulk-copy operation is complete.
- To clear all bindings, pass *colnum* as CS\_UNUSED, with *buffer*, *datafmt*, *datalen*, and *indicator* as NULL. An application typically clears all bindings when it needs to change the count that is being used for array binding.



Array binding

- Array binding is the process of binding a column to an array of program variables. At row-transfer time, multiple rows of the column are transferred either to or from the array of variables with a single `blk_rowxfer_mult` call. An application indicates array binding by setting `datafmt->count` to a value greater than 1.
- Array binding works differently for bulk-copy-in and bulk-copy-out operations.
- For bulk-copy-in operations that use array binding, you must call `blk_bind` with `buffer`, `datalen`, and `indicator` pointing to arrays. Each length and indicator variable describes the corresponding data in the buffer array. For fixed-length data, `buffer` is always a pointer to an array of fixed-length values. For variable-length data (specifically character or binary data), `buffer` is a pointer to an array of bytes. In the latter case, the packing of values can be *loose* or *dense*. The application specifies the packing method for each column by setting flags in the `datafmt->format` field:
  - Setting the `CS_BLK_ARRAY_MAXLEN` bit in `datafmt->format` specifies *loose* packing of values in the array. `blk_rowxfer_mult` retrieves the value *i* by reading `datalen[i-1]` bytes starting at the byte position computed as:

$$(i - 1) * datafmt->maxlength$$

- If the `CS_BLK_ARRAY_MAXLEN` bit is not set in `datafmt->format`, column values must be densely packed for `blk_rowxfer_mult`. Each value must be placed in the column array immediately after the previous value, without padding. `blk_rowxfer_mult` gets value *i* by reading `datalen[i-1]` bytes starting at the byte position computed as:

$$datalen[i-2] + datalen[i-3] + \dots + datalen[0]$$

In other words, the first value starts at 0, the second at `datalen[0]`, the third at `datalen[1] + datalen[0]`, and so forth.

For example, consider a character column that will receive the values “girl,” “boy,” “man,” and “woman,” and assume that this column is bound with `datafmt->maxlength` passed as 7. With loose array binding, the `buffer` and `datalen` contents would be:

```
buffer: girl  boy   man   woman
        0    7    14    21
datalen: 4, 3, 3, 5
```

With densely-packed array binding, the `buffer` and `datalen` contents would be:

```
buffer: girlboymanwoman
        0  4  7 10
datalen: 4, 3, 3, 5
```

- For bulk-copy-out operations, array binding performed with `blk_bind` works the same as array binding performed with `ct_bind`. Column arrays for bulk-copy-out are always loosely packed.
- While using array binding during a bulk-copy-out operation, it is possible for conversion, memory, or truncation errors to occur while `blk_rowxfer_mult` is writing to the destination arrays. In this case, `blk_rowxfer_mult` writes a partial result to the destination arrays and returns `CS_ROW_FAIL`.
- If array binding is in effect (for either direction), an application cannot use `blk_textxfer` to transfer data.

See also

`blk_describe`, `blk_default`, `blk_init`

## blk\_colval

Description

A server-side routine, obtains the column value from a formatted bulk-copy row.

Syntax

```
CS_RETCODE blk_colval(srvproc, blkdescp, rowp, colnum,
                      valuep, valuelen, outlenp)
```

```
SRV_PROC      *srvproc;
CS_BLKDESC    *blkdescp;
CS_BLK_ROW    *rowp;
CS_INT        colnum;
CS_VOID       *valuep;
CS_INT        valuelen;
CS_INT        *outlen;
```

Parameters

*srvproc*

A pointer to the `SRV_PROC` structure associated with the client sending the bulk-copy row. It contains all the information that Server-Library uses to manage communications and data between the Open Server application and the client.

*blkdescp*

A pointer to a CS\_BLKDESC structure containing information about bulk-copy data. This structure must have been previously allocated with a call to blk\_alloc and initialized with a call to blk\_init. This structure is used to interpret incoming formatted bulk-copy rows.

*rowp*

A pointer to the CS\_BLK\_ROW structure filled in by a prior call to blk\_getrow.

The CS\_BLK\_ROW structure is a hidden structure that holds formatted bulk-copy rows sent from the client.

*colnum*

The column number of the column of interest. Column numbers start at 1.

*valuep*

A pointer to the application buffer in which the column value from the bulk-copy row is placed.

*valuelen*

The size, in bytes, of the buffer to which *valuep* points.

*outlen*

A pointer to a CS\_INT variable. blk\_colval sets *\*outlen* to the size, in bytes, of the column data.

## Return value

blk\_colval returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

## Usage

- blk\_colval is a server-side routine. After getting the value of a specified column from a formatted bulk-copy row, it stores the value in an application buffer.
- This routine performs no implicit data conversion. Use cs\_convert to convert the data.
- To examine the column value after a call to blk\_colval, the application must know the column's datatype before making the call.
- An Open Server application cannot use this routine to retrieve text, image, sensitivity, or boundary columns. Use blk\_gettext to retrieve such columns.

## See also

blk\_getrow, blk\_gettext

## blk\_default

Description	Retrieves a column's default value.						
Syntax	<pre>CS_RETCODE blk_default(blkdesc, colnum, buffer,                        buflen, outlen) CS_BLKDESC *blkdesc; CS_INT      colnum; CS_VOID     *buffer; CS_INT      buflen; CS_INT      *outlen;</pre>						
Parameters	<p><i>blkdesc</i> A pointer to the CS_BLKDESC that serves as a control block for the bulk-copy operation. blk_alloc allocates a CS_BLKDESC structure.</p> <p><i>colnum</i> The number of the column of interest. The first column in a table is column number 1, the second is number 2, and so forth.</p> <p><i>buffer</i> A pointer to the space in which blk_default will place the default value.</p> <p><i>buflen</i> The length, in bytes, of the <i>*buffer</i> data space.</p> <p><i>outlen</i> A pointer to an integer variable.  If supplied, blk_default sets <i>*outlen</i> to the length, in bytes, of the default value.  If the default value is larger than <i>buflen</i> bytes, an application can use the value of <i>*outlen</i> to determine how many bytes are needed to hold the value.</p>						
Return value	<p>blk_default returns:</p> <table border="1"> <thead> <tr> <th>Returns</th> <th>Indicates</th> </tr> </thead> <tbody> <tr> <td>CS_SUCCEED</td> <td>The routine completed successfully.</td> </tr> <tr> <td>CS_FAIL</td> <td>The routine failed.</td> </tr> </tbody> </table> <p>blk_default returns CS_FAIL if the application has not called blk_init to initialize the bulk-copy operation.</p>	Returns	Indicates	CS_SUCCEED	The routine completed successfully.	CS_FAIL	The routine failed.
Returns	Indicates						
CS_SUCCEED	The routine completed successfully.						
CS_FAIL	The routine failed.						
Usage	<ul style="list-style-type: none"> <li>• blk_default is a client-side routine.</li> <li>• An application can call blk_default to find out whether a default value is defined for a particular target column, and, if so, what the default value is.</li> </ul>						

This information can be useful while preparing to bulk copy rows into a database. The application can set *\*datalen* and *\*indicator* values to specify whether a column's default value should be used. (*datalen* and *indicator* are the addresses of program variables that were bound to the column with `blk_bind`). See “Specifying Null values for Bulk Copy into the database” on page 140.

- If the column of interest does not have a default value, `blk_default` sets *\*outlen* to `CS_NO_DEFAULT` and returns `CS_SUCCEED`.
- An application can retrieve column defaults with `blk_default` only during a bulk-copy-in operation. The application cannot call `blk_default` until `blk_init(CS_BLK_IN)` returns `CS_SUCCEED`.

See also `blk_bind`, `blk_describe`, `blk_init`

## blk\_describe

Description Retrieves a description of a database column.

Syntax `CS_RETCODE blk_describe(blkdesc, colnum, datafmt)`

```
CS_BLKDESC    *blkdesc;
CS_INT        colnum;
CS_DATAFMT    *datafmt;
```

Parameters *blkdesc*

A pointer to the `CS_BLKDESC` that is serving as a control block for the bulk-copy operation. `blk_alloc` allocates a `CS_BLKDESC` structure.

*colnum*

The number of the column of interest. The first column in a table is column number 1, the second is number 2, and so forth.

*datafmt*

A pointer to a `CS_DATAFMT` structure. `blk_describe` fills *\*datafmt* with a description of the database column referenced by *colnum*.

During a bulk-copy-in operation, `blk_describe` fills in the following fields in the `CS_DATAFMT`:

**Table 4-4: CS\_DATAFMT fields, as set by blk\_describe for bulk-copy-in**

<b>Field name</b>	<b>blk_describe sets the field to</b>
<i>name</i>	The null-terminated name of the column, if any. A NULL name is indicated by a <i>namelen</i> of 0.
<i>namelen</i>	The actual length of the name, not including the null terminator. 0 indicates a NULL <i>name</i> .
<i>datatype</i>	A type constant representing the datatype of the column. All type constants listed on the “Types” topics page are valid, with the exception of CS_VARCHAR_TYPE and CS_VARBINARY_TYPE.
<i>maxlength</i>	The maximum possible length of the data for the column.
<i>scale</i>	The scale of the column.
<i>precision</i>	The precision of the column.

During a bulk-copy-out operation, blk\_describe fills in the following fields in the CS\_DATAFMT:

**Table 4-5: CS\_DATAFMT fields, as set by blk\_describe for bulk-copy-out**

Field name	blk_describe sets the field to
<i>name</i>	The null-terminated name of the column, if any. A NULL name is indicated by a <i>namelen</i> of 0.
<i>namelen</i>	The actual length of the name, not including the null terminator. 0 indicates a NULL <i>name</i> .
<i>datatype</i>	The datatype of the column. All datatypes listed on the “Types” topics page in the <i>Open Client Library/C Reference Manual</i> are valid.
<i>maxlength</i>	The maximum possible length of the data for the column.
<i>scale</i>	The scale of the column.
<i>precision</i>	The precision of the column.
<i>status</i>	A bit mask of the following symbols, combined with a bitwise, OR: <ul style="list-style-type: none"> <li>• CS_CANBENULL to indicate that the column can contain NULL values.</li> <li>• CS_HIDDEN to indicate that this column is a hidden column that has been exposed. Hidden columns are exposed when the CS_HIDDEN_KEYS property is set for the bulk descriptor’s parent connection.</li> <li>• CS_IDENTITY to indicate that the column is an identity column.</li> <li>• CS_KEY to indicate the column is part of the key for a table.</li> <li>• CS_VERSION_KEY to indicate the column is part of the version key for the row.</li> </ul>
<i>usertype</i>	The Adaptive Server Enterprise user-defined datatype of the column, if any. <i>usertype</i> is set in addition to (not instead of) <i>datatype</i> .
<i>locale</i>	A pointer to a CS_LOCALE structure that contains locale information for the data.

Return value

blk\_describe returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

blk\_describe returns CS\_FAIL if *colnum* does not represent a valid result column.

Usage

- blk\_describe is a client-side routine.
- blk\_describe describes the format of a database column. The application can use this information to:

- Determine the datatype and size requirements for allocating storage for retrieving rows (for bulk copy out of the database).
- Determine compatibility between program variable datatypes and the database columns (by calling `cs_will_convert` to determine whether the conversion is supported and, if necessary, by checking the data lengths).
- Perform error checking. For example, the debug version of a bulk-copy application might call `blk_describe` to confirm assumptions about the format of table columns.
- An application typically uses a column description while determining compatible program variable types and sizes.
- See the “CS\_DATAFMT Structure” topics page in the *Open Client Client-Library/C Reference Manual* for a complete description of the CS\_DATAFMT structure.

See also

`blk_default`, `blk_init`

## blk\_done

Description

Marks a complete bulk-copy operation or a complete bulk-copy batch.

Syntax

```
CS_RETCODE blk_done(blkdesc, type, outrow)
```

```
CS_BLKDESC    *blkdesc;
CS_INT        type;
CS_INT        *outrow;
```

Parameters

*blkdesc*

A pointer to the CS\_BLKDESC that is serving as a control block for the bulk-copy operation. `blk_alloc` allocates a CS\_BLKDESC structure.

*type*

One of the following symbolic values:

Value of type	blk_done
CS_BLK_ALL	Marks a complete bulk-copy-in or bulk-copy-out operation.
CS_BLK_BATCH	Marks the end of a batch of rows in a batched bulk-copy-in operation.
CS_BLK_CANCEL	Cancels a bulk-copy batch or bulk-copy operation.



*outrow*

A pointer to an integer variable. If *type* is CS\_BLK\_BATCH or CS\_BLK\_ALL, *blk\_done* sets *\*outrow* to the number of rows bulk copied to Adaptive Server Enterprise since the application's last *blk\_done* call. When *type* is CS\_BLK\_CANCEL, *\*outrow* is set to 0.

## Return value

*blk\_done* returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.
CS_PENDING	Asynchronous network I/O is in effect. See the "Asynchronous Programming" topics page in the <i>Open Client Client-Library/C Reference Manual</i> .

Common reasons for *blk\_done* failure include:

- An invalid *blkdesc* pointer
- An invalid value for *type*

## Examples

```
/*
** BulkCopyIn()
*/
```

```
CS_STATIC CS_RETCODE
BulkCopyIn(connection)
CS_CONNECTION *connection;
{
    CS_BLKDESC *blkdesc;
    CS_DATAFMT datafmt; /* variable descriptions */
    Blk_Data *dptr; /* data for transfer */
    CS_INT datalen[5]; /* variable data length */
    CS_INT len;
    CS_INT numrows;

    /*
    ** Ready to start the bulk copy in now that all the
    ** connections have been made and have a table name.
    ** Start by getting the bulk descriptor initializing.
    */
    ...CODE DELETED.....

    /*
```

```

** Now to bind the variables to the columns and

** transfer the data
*/
...CODE DELETED.....

/* ALL the rows sent so clear up */
if (blk_done(blkdesc, CS_BLK_ALL, &numrows) == CS_FAIL)
{
    ex_error("BulkCopyIn: blk_done() failed");
    return CS_FAIL;
}
if (blk_drop(blkdesc) == CS_FAIL)
{
    ex_error("BulkCopyIn: blk_drop() failed");
    return CS_FAIL;
}
return CS_SUCCEED;
}

```

## Usage

- A client-side routine called `blk_done` is necessary in both client-only and gateway applications.

---

**Note** Setting `CS_OPT_NOCOUNT` before doing a bulk copy operation on a connection, causes `blk_done` to erroneously report errors.

---

- Calling `blk_done` with *type* as `CS_BLK_ALL` marks the end of a bulk-copy operation. Once an application marks the end of a bulk-copy operation, it cannot call any Bulk-Library routines (except for `blk_drop` and `blk_alloc`) until it begins a new bulk-copy operation by calling `blk_init`.
- Calling `blk_done` with *type* as `CS_BLK_BATCH` marks the end of a batch of rows in a bulk-copy-in operation. `CS_BLK_BATCH` is legal only during bulk-copy-in operations.
- Calling `blk_done` with *type* as `CS_BLK_CANCEL` cancels the current bulk-copy operation. Rows transferred since an application's last `blk_done(CS_BLK_BATCH)` call are not saved in the database. Once an application cancels a bulk-copy operation, it cannot call any bulk-copy routines (except for `blk_drop` and `blk_alloc`) until it initializes a new bulk-copy operation by calling `blk_init`.

Calling *blk\_done* during Bulk-Copy-In operations

- When an application bulk copies data into a database, the rows are permanently saved only when the application calls *blk\_done*. During a large data transfer, *blk\_done*(CS\_BLK\_BATCH) can be called periodically to “batch” the transmitted rows into smaller units of recoverability.
- An application can batch rows by calling *blk\_done* with *type* as CS\_BLK\_BATCH once every *n* rows or when there is a lull between periods of data, as in a telemetry application. This causes all rows transferred since the application’s last *blk\_done* call to be permanently saved.
- After saving a batch of rows, an application’s first call to *blk\_rowxfer* or *blk\_rowxfer\_mult* implicitly starts the next batch.
- An application must call *blk\_done* with *type* as CS\_BLK\_ALL to send its final batch of rows. This call permanently saves the rows, marks the end of the bulk-copy operation, and cleans up internal bulk-copy data structures.

Calling *blk\_done* during bulk-copy-out operations

- After transferring the last row in a bulk-copy-out operation, an application must call *blk\_done* with *type* as CS\_BLK\_ALL to mark the end of the bulk-copy operation and clean up internal bulk-copy data structures.

See also

*blk\_init*, *blk\_rowxfer*, *blk\_rowxfer\_mult*

## blk\_drop

Description Deallocates a CS\_BLKDESC structure.

Syntax CS\_RETURNCODE *blk\_drop*(*blkdesc*)

Parameters *blkdesc*  
A pointer to a CS\_BLKDESC previously allocated through *blk\_alloc*.

Return value *blk\_drop* returns:

Returns	Indicates
CS_SUCCEED	The routine completed successfully.
CS_FAIL	The routine failed.

## Examples

```
/*
** BulkCopyIn()
*/

CS_STATIC CS_RETCODE
BulkCopyIn(connection)
CS_CONNECTION *connection;
{

CS_BLKDESC *blkdesc;
CS_DATAFMT datafmt; /* variable descriptions */
Blk_Data *dptr; /* data for transfer */
CS_INT datalen[5]; /* variable data length */
CS_INT len;

CS_INT numrows;

/*
** Ready to start the bulk copy in now that all the
** connections have been made and have a table name.
** Start by getting the bulk descriptor initializing.
*/
...CODE DELETED.....

/*
** Now to bind the variables to the columns and
** transfer the data
*/
...CODE DELETED.....

/* ALL the rows sent so clear up */
if (blk_done(blkdesc, CS_BLK_ALL, &numrows) == CS_FAIL)
{
    ex_error("BulkCopyIn: blk_done() failed");
    return CS_FAIL;
}
if (blk_drop(blkdesc) == CS_FAIL)
{
    ex_error("BulkCopyIn: blk_drop() failed");
    return CS_FAIL;
}

return CS_SUCCEED;
}
```

- Usage
- A CS\_BLKDESC structure, also called a *bulk-descriptor structure*, contains information about a particular bulk-copy operation.
  - Once a bulk-descriptor structure has been deallocated, it cannot be used again. To allocate a new CS\_BLKDESC, an application can call blk\_alloc.
  - blk\_drop is typically called after blk\_done. It must be the last routine called in a bulk-copy operation.
- See also            blk\_alloc, blk\_done

## blk\_getrow

- Description            Server-side routine retrieves and stores a formatted bulk-copy row.
- Syntax                 CS\_RETURNCODE blk\_getrow(srvproc, blkdescp, rowp)
- ```

SRV_PROC        *srvproc;
CS_BLKDESC     *blkdescp;
CS_BLK_ROW     *rowp;

```
- Parameters
- srvproc*  
A pointer to the SRV\_PROC structure associated with the client sending the bulk-copy row. It contains all the information that Server-Library uses to manage communications and data between the Open Server and the client.
- blkdescp*  
A pointer to a CS\_BLKDESC structure containing information about bulk-copy data. This structure must have been previously allocated with a call to blk\_alloc and initialized with a call to blk\_init. This structure is used to interpret incoming formatted bulk-copy rows.
- rowp*  
A pointer to a CS\_BLK\_ROW structure containing space for a formatted bulk-copy row. Space must have been previously allocated with blk\_rowalloc.
- The CS\_BLK\_ROW structure is a hidden structure that holds formatted bulk-copy rows sent from the client.
- Return value            blk\_getrow returns:

| Returns    | Indicates                           |
|------------|-------------------------------------|
| CS_SUCCEED | The routine completed successfully. |

| Returns         | Indicates                                                                                                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS_END_DATA     | There are no more rows.                                                                                                                                                                                                                      |
| CS_BLK_HAS_TEXT | The row contains some text, image, sensitivity, or boundary data. Use blk_gettext to retrieve the text, image, sensitivity, or boundary data. Note that a return value of CS_BLK_HAS_TEXT implies a successful return, just like CS_SUCCEED. |
| CS_FAIL         | The routine failed.                                                                                                                                                                                                                          |

### Usage

- blk\_getrow is a server-side routine that is useful in gateway applications.
- This routine copies the incoming formatted bulk-copy row into the CS\_BLK\_ROW structure to which *rowp* points. The row data is saved only until the next call to blk\_getrow. The application must have previously allocated the space for the row using blk\_rowalloc.
- Once a row has been received through blk\_getrow, the application may examine the contents of any fields (other than text, image, sensitivity, or boundary fields) using blk\_colval.
- Use blk\_gettext to retrieve text, image, sensitivity, and boundary fields.
- A bulk-copy row may subsequently be sent to another server using the blk\_sendrow routine.
- An application must read all incoming rows with blk\_getrow, until there are no more rows.
- Once blk\_getrow returns CS\_END\_DATA, the application must drop the space allocated for the row using blk\_rowdrop.

### See also

blk\_colval, blk\_gettext, blk\_rowalloc

## blk\_gettext

### Description

Server-side routine retrieves the text, image, sensitivity, or boundary portion of an incoming formatted bulk-copy row.

### Syntax

```
CS_RETCODE blk_gettext(srvproc,blkdescp, rowp, bufp, bufsize, outlenp)
    SRV_PROC      *srvproc;
    CS_BLKDESC    *blkdescp;
    CS_BLK_ROW    *rowp;
    CS_BYTE       *bufp;
```

|            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | CS_INT          | bufsize;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | CS_INT          | *outlenp;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Parameters | <i>srvproc</i>  | A pointer to the SRV_PROC structure associated with the client sending the bulk-copy row. This structure contains all the information that Server-Library uses to manage communications and data between the Open Server application and the client.                                                                                                                                                                                                                                                                           |
|            | <i>blkdescp</i> | A pointer to a CS_BLKDESC structure containing information about bulk-copy data. This structure must have been previously allocated with a call to blk_alloc and initialized with a call to blk_init. This structure is used to interpret incoming formatted bulk-copy rows.                                                                                                                                                                                                                                                   |
|            | <i>rowp</i>     | A pointer to the formatted bulk-copy row read from the client through a prior call to blk_getrow.<br><br>The CS_BLK_ROW structure is a hidden structure that holds formatted bulk-copy rows sent from the client.                                                                                                                                                                                                                                                                                                              |
|            | <i>bufp</i>     | A pointer to the application buffer in which Bulk-Library places the text, image, sensitivity, or boundary data.                                                                                                                                                                                                                                                                                                                                                                                                               |
|            | <i>bufsize</i>  | The size, in bytes, of the space pointed at by <i>bufp</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|            | <i>outlenp</i>  | A pointer to a CS_INT variable, which is set to the number of bytes actually read by blk_gettext. It may be less than <i>bufsize</i> . To determine whether all of the text, image, sensitivity, or boundary part of the row has been read, check for a return code of CS_END_DATA. An <i>*outlenp</i> value that is less than <i>bufsize</i> does not necessarily indicate the end of a row. For example, it could indicate the end of a text, image, sensitivity, or boundary column that is not the last column in the row. |

Return value blk\_gettext returns:

| Returns     | Indicates                                                                                                                                             |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED  | The routine completed successfully.                                                                                                                   |
| CS_END_DATA | There are no more text, image, sensitivity, or boundary fields for the current incoming bulk-copy row. Call blk_getrow to get the next bulk-copy row. |
| CS_FAIL     | The routine failed.                                                                                                                                   |

- Usage
- blk\_gettext is a server-side routine that is useful in gateway applications.
  - This routine is used with blk\_getrow and blk\_colval to receive formatted bulk-copy rows and route them to an Adaptive Server Enterprise. This routine retrieves the text, image, sensitivity, or boundary portions of the row.
  - Bulk-copy rows are formatted so that all text, image, sensitivity, and boundary fields occur at the end of the row, after all the other types of fields. To route a row to an Adaptive Server Enterprise, first call blk\_getrow to retrieve all the parts of the row containing other types of fields. Then, call blk\_colval to retrieve and store portions of the row containing other types of fields. Decide where this data goes and send it to the remote server, using blk\_sendrow. Call blk\_gettext to copy text, image, sensitivity, or boundary data into an application buffer. Finally, call blk\_sendtext to send this information to the remote server.
  - If an incoming bulk-copy row has any text, image, sensitivity, or boundary fields, blk\_getrow returns CS\_BLK\_HAS\_TEXT.
  - It is not an error to call blk\_gettext if the row contains no text, image, sensitivity, or boundary fields. The routine simply returns CS\_END\_DATA.
  - This routine must be called after blk\_getrow. Also, it must be called until it returns CS\_END\_DATA, to fully read in a bulk-copy row.
  - Before rows can be sent to a server, the gateway application must have set up the bulk-copy operation with a call to blk\_init.
  - It is critical that the table for which the bulk-copy operation was initialized and the table into which the client is bulk copying are the same table.
- See also blk\_colval, blk\_getrow, blk\_gettext, blk\_sendtext

## blk\_init

- Description Initiates a bulk-copy operation.
- Syntax CS\_RETCODE blk\_init(blkdesc, direction, tablename,  
tnamelen)
- CS\_BLKDESC \*blkdesc;  
CS\_INT direction;



```

CS_CHAR      *tablename;
CS_INT       tnamelen;

```

## Parameters

*blkdesc*

A pointer to the CS\_BLKDESC controlling the bulk-copy operation. An application can allocate a CS\_BLKDESC by calling `blk_alloc`.

The parent connection of the CS\_BLKDESC must be open when `blk_init` is called and cannot have any pending results.

*direction*

One of the following symbolic values, to indicate the direction of the bulk-copy operation:

| Value of direction | blk_init                                                                     |
|--------------------|------------------------------------------------------------------------------|
| CS_BLK_IN          | Begins a bulk-copy operation to upload rows from the client to the server.   |
| CS_BLK_OUT         | Begins a bulk-copy operation to download rows from the server to the client. |

*tablename*

A pointer to the name of the table of interest. Any legal server table name is acceptable. The table name cannot contain a colon (:) or slice number.

*tnamelen*

The length, in bytes, of *tablename*. If *tablename* is null-terminated, pass *tnamelen* as CS\_NULLTERM.

## Return value

`blk_init` returns:

| Returns    | Indicates                                                                                                                                    |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED | The routine completed successfully.                                                                                                          |
| CS_FAIL    | The routine failed.                                                                                                                          |
| CS_PENDING | Asynchronous network I/O is in effect. See the “Asynchronous Programming” topics page in the <i>Open Client Library/C Reference Manual</i> . |

A common cause of failure is specifying a non-existent table.

## Examples

```

/*
** BulkCopyIn()
** Ex_tabname is globally defined.
*/
CS_STATIC CS_RETCODE
BulkCopyIn(connection)

```

```
CS_CONNECTION  *connection;
{
    CS_BLKDESC *blkdesc;
    CS_DATAFMT datafmt; /* variable descriptions */
    Blk_Data *dptr; /* data for transfer */
    CS_INT datalen[5]; /* variable data length */
    CS_INT len;
    CS_INT numRows;

    /*
    ** Ready to start the bulk copy in now that all the
    ** connections have been made and have a table name.
    ** Start by getting the bulk descriptor and
    ** initializing.
    */
    if (blk_alloc(connection, BLK_VERSION_100, &blkdesc)
        != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_alloc() failed");
        return CS_FAIL;
    }

    if (blk_init(blkdesc, CS_BLK_IN,
                Ex_tabname, strlen(Ex_tabname)) == CS_FAIL)
    {
        ex_error("BulkCopyIn: blk_init() failed");
        return CS_FAIL;
    }

    /*
    ** Bind the variables to the columns and send the rows,
    ** and then clean up.
    */
    ...CODE DELETED....

    return CS_SUCCEED;
}
```

**Usage**

- blk\_init begins a bulk-copy operation.
- blk\_init is a client-side routine. However, it is necessary in both client-only and gateway applications.
- Multiple CS\_BLKDESC and CS\_COMMAND structures can exist on the same connection, but only one CS\_BLKDESC or CS\_COMMAND structure can be active at the same time.

- A bulk-copy operation begun with `blk_init` must be completed before the connection can be used for any other operation.
- A bulk-copy operation cannot be started when the connection is being used to initiate, send, or process the results of other Client-Library or Bulk-Library commands.
- When a bulk-copy operation is complete, an application must call `blk_done` with *type* as `CS_BLK_ALL` to mark the end of the bulk-copy operation and clean up internal Bulk-Library data structures.

See also

`blk_alloc`, `blk_bind`, `blk_done`, `blk_rowxfer_mult`

## blk\_props

Description

Sets or retrieves bulk-descriptor structure properties.

Syntax

```
CS_RETCODE blk_props(blkdesc, action, property,
                    buffer, buflen, outlen)
```

```
CS_BLKDESC    *blkdesc;
CS_INT        action;
CS_INT        property;
CS_VOID       *buffer;
CS_INT        buflen;
CS_INT        *outlen;
```

Parameters

*blkdesc*

A pointer to a `CS_BLKDESC` structure. A bulk-descriptor structure contains information about a bulk-copy operation. `blk_alloc` allocates a bulk-descriptor structure.

*action*

One of the following symbolic constants:

| Value of action       | blk_props                                                             |
|-----------------------|-----------------------------------------------------------------------|
| <code>CS_SET</code>   | Sets the value of the property                                        |
| <code>CS_GET</code>   | Retrieves the value of the property                                   |
| <code>CS_CLEAR</code> | Clears the value of the property by resetting it to its default value |

*property*

A symbolic constant that indicates the property of interest. Table 4-6 on page 161 lists valid *property* constants and describes each property.

*buffer*

If a property value is being set, *buffer* points to the value to use in setting the property.

If a property value is being retrieved, *buffer* points to the space in which blk\_props will place the requested information.

The C datatype of the value depends on the property. Refer to Table 4-6 on page 161 for the datatype of the property of interest.

*buflen*

Generally, *buflen* is the length, in bytes, of *\*buffer*.

If a property value is being set and the value in *\*buffer* is null-terminated, pass *buflen* as CS\_NULLTERM.

If *\*buffer* is a fixed-length or symbolic value, pass *buflen* as CS\_UNUSED.

*outlen*

A pointer to an integer variable.

If a property value is being set, *outlen* is not used and should be passed as NULL.

If a property value is being retrieved and *outlen* is supplied, blk\_props sets *\*outlen* to the length, in bytes, of the requested information.

If the information is larger than *buflen* bytes, an application can use the value of *\*outlen* to determine how many bytes are needed to hold the information.

## Return value

blk\_props returns:

| Returns    | Indicates                           |
|------------|-------------------------------------|
| CS_SUCCEED | The routine completed successfully. |
| CS_FAIL    | The routine failed.                 |

## Usage

- Bulk-descriptor properties define aspects of a specific bulk-copy operation.
- Applications that set Bulk-Library properties must do so after calling blk\_alloc to allocate a bulk-descriptor structure and before calling blk\_init to initiate a specific bulk-copy operation.
- An application can use blk\_props to set or retrieve the following properties:

**Table 4-6: Client/Server bulk descriptor properties**

| Property name     | Description                                                                                                 | *buffer is                                       | Applies to     | Notes                                                                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BLK_CONV          | Character-set conversion performed by client.                                                               | CS_TRUE or CS_FALSE.                             | IN copies only | To disable character-set conversion on the current server connection, set CS_NOCHARSETCNV_REQD to CS_TRUE. See the ct_con_props section in the <i>Open Client Client-Library/C Reference Manual</i> . |
| BLK_CUSTOM_CLAUSE | A custom, application-specific SQL clause to add after the existing with clause of the insert bulk command. | A character string containing the custom clause. | IN copies only | Supported only by server versions that support the custom SQL clause. Currently used only by internal products.                                                                                       |

| Property name  | Description                                                                                                                                                                                                                                                               | *buffer is                                                                                                                                                                                                                                                                                                                                               | Applies to             | Notes |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|
| BLK_IDENTITY   | <p>Whether values for a table's identity column are specified explicitly for each row to be inserted.</p> <p>This property cannot be set to CS_TRUE if BLK_IDSTARTNUM has been set for a bulk-copy-in operation.</p>                                                      | <p>CS_TRUE or CS_FALSE.</p> <p>The default is CS_FALSE, which indicates that identity values are either:</p> <ul style="list-style-type: none"> <li>• Computed from the starting value indicated by BLK_IDSTARTNUM, or</li> <li>• Computed by Adaptive Server Enterprise as data is inserted, based on existing identity values in the table.</li> </ul> | IN copies only         |       |
| BLK_IDSTARTNUM | <p>The starting value for identity columns in inserted rows. The first inserted row uses this value, and the value is incremented for each subsequent row.</p> <p>This property cannot be set if BLK_IDENTITY has been set to CS_TRUE for the bulk-copy-in operation.</p> | <p>A CS_NUMERIC variable containing the starting identity value.</p> <p>There is no default.</p>                                                                                                                                                                                                                                                         | IN copies only         |       |
| BLK_NOAPI_CHK  | <p>Whether parameter and error checking for illegal parameter values and state transitions are disabled for Bulk-Library calls.</p>                                                                                                                                       | <p>CS_TRUE or CS_FALSE.</p> <p>The default is CS_FALSE, which means error checking is performed.</p>                                                                                                                                                                                                                                                     | Both IN and OUT copies |       |

| Property name       | Description                                                                                              | *buffer is                                                                                                                                                                                          | Applies to             | Notes                                  |
|---------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------|
| BLK_PARTITION       | Property to support BCP partitions for BCP_IN and BCP_OUT operations.                                    | A character string containing the name of the partition.                                                                                                                                            | Both IN and OUT copies |                                        |
| BLK_SENSITIVITY_LBL | Whether a table's <i>sensitivity</i> column is included in the bulk-copy operation.                      | CS_TRUE or CS_FALSE (default).                                                                                                                                                                      | Both IN and OUT copies | Secure Adaptive Server Enterprise only |
| BLK_SLICENUM        | For bulk-copy into a partitioned table. Specifies the partition number that copied rows are inserted to. | A CS_INT variable containing a positive value representing the partition number. The default is CS_UNUSED, which indicates that Adaptive Server Enterprise will randomly choose a partition number. | IN copies only         |                                        |

#### BLK\_CUSTOM\_CLAUSE property

To process a select into existing table statement that inserts rows into a proxy table, Adaptive Server uses the Bulk-Library to generate a bulk-copy operation. However, full logging is not available for regular bulk-copy operations. `BLK_CUSTOM_CLAUSE` enables Adaptive Server to distinguish between ordinary bulk-copy operations and bulk-copy operations that have resulted from an insert into statement affecting a proxy table. Bulk-copy operations that result from such an insert into statement can then be appended with the custom clause specified by `BLK_CUSTOM_CLAUSE`. Adaptive Server can detect this clause and perform full logging.

- A select into operation is allowed only if the Adaptive Server select into/bulkcopy/plsort database option is set to on.
- For full logging of a select into operation, the Adaptive Server full logging for select into database option must be set to on.

#### Example

`BLK_CUSTOM_CLAUSE` is set with `blk_props`:

```
blk_props (blkdesc, CS_SET, BLK_CUSTOM_CLAUSE,
```

```
(CS_VOID *)"from select_into", CS_NULLTERM, NULL);
```

Adaptive Server generates a bulk-copy operation with the specified custom clause appended:

```
insert bulk mydb.mytable with noddescribe from  
select_into
```

where mydb and mytable are the affected database and table.

#### BLK\_IDENTITY property

- BLK\_IDENTITY determines whether a table's identity column is included in a bulk-copy-in operation.
- BLK\_IDENTITY does not affect bulk-copy-out operations.
- If BLK\_IDENTITY is CS\_TRUE, the application must supply data for the identity column.

If BLK\_IDENTITY is CS\_FALSE, the application does not need to supply data for the identity column. In this case, the server supplies a default value for the column.

- BLK\_IDENTITY works by setting identity\_insert on for the database table of interest. This allows values to be inserted into the identity column. When the bulk-copy operation is finished, the identity\_insert option for the table is turned off.

See the *Adaptive Server Enterprise Reference Manual*.

#### BLK\_NOAPI\_CHK property

- BLK\_NOAPI\_CHK can be set to CS\_TRUE to disable parameter and state checking of Bulk-Library calls. The default is CS\_FALSE, which enables parameter checking and state checking of each Bulk-Library call. These two types of error checking are described below:
  - *Parameter checking* determines whether the application has passed valid parameters and combinations of parameters in the call.
  - *State checking* ensures that calls are made in the required sequence. For example, blk\_init must be called before blk\_bind.



The default error checking ensures that your application calls Bulk-Library routines in the appropriate manner. With API checking enabled, a descriptive error message is raised when the application commits a usage error, and the routine that discovers the error returns CS\_FAIL.

---

**Warning!** With API checking disabled, Bulk-Library usage errors may lead to unexpected behavior or even program crashes.

---

- If your application has been fully tested and completely debugged, you may see improved performance with API checking disabled. Bulk-Library also calls Client-Library internally, so to get the full benefit, you should also disable API checking in Client-Library (by calling `ct_config` to set the CS\_NOAPI\_CHK context property to CS\_TRUE).
- BLK\_NOAPI\_CHK does not affect testing for errors, such as network errors or conversion overflow, that can occur in well-behaved applications.

#### BLK\_SENSITIVITY\_LBL property

- BLK\_SENSITIVITY\_LBL is useful in applications that perform bulk-copy operations to or from Secure Adaptive Server Enterprise.
- BLK\_SENSITIVITY\_LBL determines whether or not data for the *sensitivity* column is included in a bulk-copy operation. By default, *sensitivity* column data is not included.
- BLK\_SENSITIVITY\_LBL affects both bulk-copy-in and bulk-copy-out operations.
- If BLK\_SENSITIVITY\_LBL is CS\_TRUE, the application must supply data for the *sensitivity* column on bulk-copy-in operations and will receive data from the *sensitivity* column on bulk-copy-out operations.

If BLK\_SENSITIVITY\_LBL is CS\_FALSE, the application does not need to supply data for the *sensitivity* column on bulk-copy-in operations and will not receive data from the *sensitivity* column on bulk-copy-out operations.

- BLK\_SENSITIVITY\_LBL is applicable to Secure Adaptive Server Enterprise copies only. `blk_init` fails if BLK\_SENSITIVITY\_LBL is CS\_TRUE and the application attempts a bulk-copy operation against a standard Adaptive Server Enterprise.

- Application users copying into the *sensitivity* column must have the `bcpin_labels_role` role activated on Secure Adaptive Server Enterprise. `blk_init` fails if the `bcpin_labels_role` is not activated for the connection's user.
- See your Secure Adaptive Server Enterprise documentation.

#### BLK\_PARTITION property

- Only one name can be provided. A single BLKLIB operation always operates on an entire table or on a single partition. If no partition name is provided, the BLKLIB will not operate on a specific partition but on the entire table.
- This property can be used for both BCP\_IN and BCP\_OUT operations. Either BLK\_PARTITION or BLK\_SLICENUM can be used; if one is set, the other is cleared.
- The BLK\_PARTITION property does not require you to set `CS_VERSION_155` or `BLK_VERSION_155`.

See also

`blk_alloc`, `blk_init`

## blk\_rowalloc

**Description** A server-side routine, allocates space for a formatted bulk-copy row.

**Syntax** `CS_RETCODE blk_rowalloc(srvproc, row)`

```
SRV_PROC      *srvproc;  
CS_BLK_ROW   **row;
```

**Parameters**

*srvproc*

A pointer to the `SRV_PROC` structure associated with the client sending formatted bulk-copy rows. It contains all the information that Server-Library uses to manage communications and data between the Open Server and the client.

*row*

A pointer to a pointer to a `CS_BLK_ROW` structure.

The `CS_BLK_ROW` structure is a hidden structure that holds formatted bulk-copy rows sent from the client.

**Return value**

`blk_rowalloc` returns:

| Returns    | Indicates                           |
|------------|-------------------------------------|
| CS_SUCCEED | The routine completed successfully. |
| CS_FAIL    | The routine failed.                 |

- Usage
- blk\_rowalloc is a server-side routine that is useful in gateway applications.
  - This routine allocates space in which blk\_getrow will place the formatted bulk-copy row.
  - The row space is used by all calls to blk\_getrow.
  - When all rows have been retrieved and sent to the remote server, call blk\_rowdrop to drop the space allocated for the row.

See also blk\_getrow, blk\_rowdrop, blk\_gettext

## blk\_rowdrop

Description A server-side routine, frees space previously allocated for a formatted bulk-copy row.

Syntax CS\_RETCODE blk\_rowdrop(srvproc, row)

```
SRV_PROC      *srvproc;
CS_BLK_ROW    *row;
```

Parameters *srvproc*  
A pointer to the SRV\_PROC structure associated with the client sending formatted bulk-copy rows. It contains all the information that Server-Library uses to manage communications and data between the Open Server application and the client.

*row*  
A pointer to a hidden CS\_BLK\_ROW structure that was allocated by a call to blk\_rowalloc.

Return value blk\_rowdrop returns:

| Returns    | Indicates                           |
|------------|-------------------------------------|
| CS_SUCCEED | The routine completed successfully. |
| CS_FAIL    | The routine failed.                 |

- Usage
- blk\_rowdrop is a server-side routine that is useful in gateway applications.
  - This routine frees space previously allocated by blk\_rowalloc.

- It must be called after all formatted bulk-copy rows have been retrieved and sent to the remote server.

See also `blk_getrow`, `blk_rowalloc`, `blk_gettext`

## **blk\_rowxfer**

|              |                                                                                                                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description  | Transfers one or more rows during a bulk-copy operation without specifying or receiving a row count.                                                                                             |
| Syntax       | <code>CS_RETCODE blk_rowxfer(blkdesc)</code><br><br><code>CS_BLKDESC *blkdesc;</code>                                                                                                            |
| Parameters   | <i>blkdesc</i><br>A pointer to the <code>CS_BLKDESC</code> that is serving as a control block for the bulk-copy operation. <code>blk_alloc</code> allocates a <code>CS_BLKDESC</code> structure. |
| Return value | <code>blk_rowxfer</code> returns:                                                                                                                                                                |

**Table 4-7: blk\_rowxfer return values**

| Returns         | Indicates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED      | The routine completed successfully.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| CS_FAIL         | The routine failed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| CS_PENDING      | Asynchronous network I/O is in effect. See the “Asynchronous Programming” topics page in the <i>Open Client Client-Library/C Reference Manual</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| CS_BLK_HAS_TEXT | The row contains one or more columns which have been marked for transfer using blk_textxfer.<br><br>The application must call blk_textxfer to transfer data for these columns before calling blk_rowxfer to transfer the next row.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| CS_END_DATA     | When copying data out from a database, blk_rowxfer returns CS_END_DATA to indicate that all rows have been transferred.<br><br>When copying data into a database, blk_rowxfer does not return CS_END_DATA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| CS_ROW_FAIL     | A recoverable error occurred while fetching a row.<br><br>Applies to bulk-copy-out operations only.<br><br>Recoverable errors include memory allocation failures and conversion errors (such as overflowing the destination buffer) that occur while copying row values to program variables. In the case of buffer-overflow errors, blk_rowxfer sets the corresponding <i>*indicator</i> variable(s) to a value greater than 0. Indicator variables must have been specified in the application’s calls to blk_bind.<br><br>When blk_rowxfer returns CS_ROW_FAIL, the application must continue calling blk_rowxfer to keep retrieving rows, or it can call ct_cancel to cancel the remaining results. |

**Examples**

```

/*
** BulkCopyIn()
** BLKDATA and DATA_END are defined in the bulk copy
** example program.
*/

CS_STATIC CS_RETCODE
BulkCopyIn(connection)
CS_CONNECTION *connection;
{
    CS_BLKDESC *blkdesc;
    CS_DATAFMT datafmt; /* variable descriptions */

```

```
Blk_Data *dptr; /* data for transfer */
CS_INT datalen[5]; /* variable data length */
CS_INT len;
CS_INT numRows;

/*
** Ready to start the bulk copy in now that all the
** connections have been made and have a table name.
** Start by getting the bulk descriptor initializing.
**
...CODE DELETED....
*/
/*
** Now to bind the variables to the columns and
** transfer the data
**
datafmt.locale = 0;
datafmt.count = 1;
dptr = BLKDATA;
while (dptr->pub_id != DATA_END)
{
    datafmt.datatype = CS_INT_TYPE;
    datafmt.maxlength = sizeof(CS_INT);
    datalen[0] = CS_UNUSED;

    if (blk_bind(blkdesc, 1, &datafmt, &dptr->pub_id,
                &datalen[0], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(1) failed");
        return CS_FAIL;
    }
    datafmt.datatype = CS_CHAR_TYPE;
    datafmt.maxlength = MAX_PUBNAME - 1;
    datalen[1] = strlen(dptr->pub_name);
    if (blk_bind(blkdesc, 2, &datafmt, dptr->pub_name,
                &datalen[1], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(2) failed");
        return CS_FAIL;
    }
    datafmt.maxlength = MAX_PUBCITY - 1;
    datalen[2] = strlen(dptr->pub_city);
    if (blk_bind(blkdesc, 3, &datafmt, dptr->pub_city,
                &datalen[2], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(3) failed");
    }
}
```

```

        return CS_FAIL;
    }
    datafmt.maxlength = MAX_PUBST - 1;
    datalen[3] = strlen(dptra->pub_st);
    if (blk_bind(blkdesc, 4, &datafmt, dptra->pub_st,
                &datalen[3], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(4) failed");
        return CS_FAIL;
    }
    datafmt.maxlength = MAX_BIO - 1;
    datalen[4] = strlen((char *)dptra->pub_bio);
    if (blk_bind(blkdesc, 5, &datafmt, dptra->pub_bio,
                &datalen[4], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(5) failed");
        return CS_FAIL;
    }
    if (blk_rowxfer (blkdesc) == CS_FAIL)
    {
        ex_error("BulkCopyIn: blk_rowxfer() failed");
        return CS_FAIL;
    }
    dptra++;
}

/* ALL the rows sent so clear up */
...CODE DELETED.....

return CS_SUCCEED;
}

```

**Usage**

- blk\_rowxfer is a client-side routine.
- blk\_rowxfer is equivalent to calling blk\_rowxfer\_mult with a NULL *row\_count* parameter.
- See blk\_rowxfer\_mult in this chapter.

**See also**

blk\_bind, blk\_rowxfer\_mult, blk\_textxfer

## blk\_rowxfer\_mult

**Description**

Transfers one or more rows during a bulk-copy operation.

Syntax CS\_RETCODE blk\_rowxfer\_mult(blkdesc, row\_count)

CS\_BLKDESC \*blkdesc;  
CS\_INT \*row\_count;

Parameters

*blkdesc*

A pointer to the CS\_BLKDESC that is serving as a control block for the bulk-copy operation. blk\_alloc allocates a CS\_BLKDESC structure.

*row\_count*

A pointer to a CS\_INT variable or NULL.

For bulk-copy-out operations, blk\_rowxfer\_mult returns with *\*row\_count* set to the number of rows read by the call. If *row\_count* is NULL, this information is not available to the application. (The application can call blk\_done to determine how many rows have been transferred by the cumulative number of blk\_rowxfer\_mult calls since the last blk\_done call—but it is simpler to use a row count variable.

For bulk-copy-in operations, blk\_rowxfer\_mult sends the number of rows specified by *\*row\_count* to the server. If *row\_count* is NULL or *\*row\_count* is 0, then the number of rows specified by *datafmt->count* in previous calls to blk\_bind are sent to the server.

*row\_count* is used by applications that perform array binding. See “Array binding” on page 141.

Return value

blk\_rowxfer\_mult returns:



**Table 4-8: blk\_rowxfer\_mult return values**

| Returns         | Indicates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED      | The routine completed successfully.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| CS_FAIL         | The routine failed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| CS_PENDING      | Asynchronous network I/O is in effect. See the “Asynchronous Programming” topics page in the <i>Open Client Client-Library/C Reference Manual</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| CS_BLK_HAS_TEXT | The row contains one or more columns which have been marked for transfer using blk_textxfer.<br>The application must call blk_textxfer to transfer data for these columns row before calling blk_rowxfer_mult to transfer the next row.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CS_END_DATA     | When copying data out from a database, blk_rowxfer_mult returns CS_END_DATA to indicate that all rows have been transferred.<br>When copying data into a database, blk_rowxfer_mult does not return CS_END_DATA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| CS_ROW_FAIL     | A recoverable error occurred while fetching a row. Applies to bulk-copy-out operations only.<br>blk_rowxfer_mult sets *row_count to indicate the number of rows transferred (including the row containing the error) and transfers no rows after that row. The next call to blk_rowxfer_mult will read rows starting with the row after the one where the error occurred.<br>Recoverable errors include memory allocation failures and conversion errors (such as overflowing the destination buffer) that occur while copying row values to program variables. In the case of buffer-overflow errors, blk_rowxfer_mult sets the corresponding *indicator variable(s) to a value greater than 0. Indicator variables must have been specified in the application’s calls to blk_bind.<br>When blk_rowxfer_mult returns CS_ROW_FAIL, the application must continue calling blk_rowxfer_mult to keep retrieving rows, or it can call ct_cancel to cancel the remaining results. |

A common reason for a blk\_rowxfer\_mult failure is conversion error.

#### Usage

- blk\_rowxfer\_mult is a client-side routine.
- An application calls blk\_rowxfer\_mult to transfer rows between program variables (bound with blk\_bind) and the database table:

- During a bulk-copy-in operation, blk\_rowxfer\_mult copies data from program variables to the database.
- During a bulk-copy-out operation, blk\_rowxfer\_mult copies data from the database and places it in program variables.
- Application variables must first be bound to table columns with blk\_bind for blk\_rowxfer\_mult to read or write their contents.

#### *blk\_rowxfer\_mult* and bulk-copy-in operations

- To transfer rows into a database, an application calls blk\_rowxfer\_mult repeatedly to transfer values from program variables to the database table. See “Program structure for bulk-copy-in operations” on page 117 for the sequence of Bulk-Library calls used to transfer data into a database table.
- During bulk-copy-in operations, the value of blk\_rowxfer\_mult’s *\*row\_count* parameter overrides the array lengths that were passed to blk\_bind (as *datafmt->count*). The number of rows transferred per call is determined as follows:
  - If the application passes the address of a row count variable as the *row\_count* parameter, then blk\_rowxfer\_mult transfers either *datafmt->count* or *\*row\_count* rows, whichever is smaller.
  - If the application passes *row\_count* as NULL, blk\_rowxfer\_mult always transfers *datafmt->count* rows.

For example, if an application was uploading 103 rows and it used array binding to transfer 10 rows at a time, the application would:

- Pass *datafmt->count* as 10 in all calls to blk\_bind
- Set *\*row\_count* to 10 for the first 10 calls to blk\_rowxfer\_mult
- Set *\*row\_count* to 3 for the final call to blk\_rowxfer\_mult
- To upload row data that contains large text or image column values, you can forgo array binding and use blk\_textxfer together with blk\_rowxfer\_mult to send large values one piece at a time. See “Transferring large text or image values in chunks” on page 175 for details.
- A bulk-copy-in operation is not automatically terminated if blk\_rowxfer\_mult returns CS\_FAIL. An application can continue to call blk\_rowxfer\_mult after correcting or discarding the problem row.

*blk\_rowxfer\_mult* and bulk-copy-out operations

- To transfer rows out of a database, an application calls *blk\_rowxfer\_mult* repeatedly to read column values from the server and place them in program variables. See “Program structure for bulk-copy-out operations” on page 119 for the sequence of Bulk-Library calls used to read data from a database table.
- For bulk copies out of a database, the use of *blk\_rowxfer\_mult* is similar to the use of the Client-Library *ct\_fetch* routine.
- The number of rows to be read by *blk\_rowxfer\_mult* is determined by the value passed as *datafmt*→*count* in the application’s calls to *blk\_bind*. *blk\_rowxfer\_mult* attempts to read this number of rows and write the data to program variables.

Fewer rows may be read by the final call to *blk\_rowxfer\_mult* (that is, the call that retrieves the last row in the table) or if a conversion error occurs while data is being retrieved. The former condition is indicated by a return code of *CS\_END\_DATA*; the latter, by *CS\_ROW\_FAIL*. In either case, *blk\_rowxfer\_mult* returns with *\*row\_count* set to the actual number of rows read.

- To download row data that contains large text or image column values, you can forgo array binding and use *blk\_textxfer* together with *blk\_rowxfer\_mult* to read large values one piece at a time. See the following section for details.

Transferring large *text* or *image* values in chunks

- If array binding is not in effect, an application can use *blk\_textxfer* in conjunction with *blk\_rowxfer\_mult* to transfer rows containing large text or image values. For information on how to do this, see “Bulk-Library client programming” on page 113.
- For tables that contain large text or image columns, it is often convenient for an application to transfer the text or image data in fixed-size chunks rather than all at once. If a column is transferred all at once, the application must have sufficient buffer space to hold the value in its entirety.
- To transfer large column values in chunks:
  - The application passes *buffer* as NULL in its *blk\_bind* call for the column. This setting specifies that data for this column will be transferred using *blk\_textxfer*. For a bulk-copy-in operation, the application must also specify the length of the column value as *blk\_bind*’s *\*datalen* parameter.

- The application calls `blk_rowxfer_mult` to transfer the row. `blk_rowxfer_mult` returns `CS_BLK_HAS_TEXT`, indicating that Bulk-Library expects further data for this row to be transferred with `blk_textxfer`.
- For each column requiring transfer, the application calls `blk_textxfer` in a loop until `blk_textxfer` returns `CS_END_DATA`, indicating that all of the data for this column has been transferred.

See also `blk_bind`, `blk_textxfer`

## **blk\_sendrow**

**Description** A server-side routine, sends a formatted bulk-copy row obtained from *blk\_getrow*.

**Syntax** `CS_RETCODE blk_sendrow(blkdesc, row)`

```
CS_BLKDESC    *blkdesc;  
CS_BLK_ROW    *row;
```

**Parameters**

*blkdesc*

A pointer to the `CS_BLKDESC` that is serving as a control block for the bulk-copy operation. `blk_alloc` allocates a `CS_BLKDESC` structure.

*row*

A pointer to a `CS_BLK_ROW` structure. The `CS_BLK_ROW` is a hidden structure that holds formatted bulk-copy rows sent from the client. A gateway application can fill in a `CS_BLK_ROW` structure with a formatted row by calling the server-side routine `blk_getrow`.

**Return value** `blk_sendrow` returns:

**Table 4-9: blk\_sendrow return values**

| Returns         | Indicates                                                                                                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED      | The routine completed successfully.                                                                                                                                                                                                         |
| CS_FAIL         | The routine failed.                                                                                                                                                                                                                         |
| CS_BLK_HAS_TEXT | The row contains one or more text, image, sensitivity, or boundary columns. The application must call blk_gettext and blk_sendtext to transfer the columns for this row before calling blk_getrow and blk_sendrow to transfer the next row. |
| CS_PENDING      | Asynchronous network I/O is in effect. See the “Asynchronous Programming” topics page in the <i>Open Client Client-Library/C Reference Manual</i> .                                                                                         |

**Usage**

- blk\_sendrow is a server-side routine.
- A gateway application uses blk\_sendrow in conjunction with blk\_getrow. Together, the two routines enable a gateway application to receive formatted bulk-copy rows from an Open Client application and send them on to Adaptive Server Enterprise.
- blk\_sendrow is a gateway-specific substitute for blk\_rowxfer or blk\_rowxfer\_mult. An application can call blk\_sendrow only after calling blk\_getrow to retrieve a formatted row.
- The sequence of calls in the gateway application is:
  - blk\_getrow, to obtain a formatted bulk-copy row
  - blk\_sendrow, to send the formatted row to Adaptive Server Enterprise

If blk\_getrow returns CS\_BLK\_HAS\_TEXT, the application must call the following routines in a loop, until blk\_gettext returns CS\_END\_DATA:

- blk\_gettext, to pick up a chunk of text, image, sensitivity, or boundary data
- blk\_sendtext, to send a chunk of text, image, sensitivity, or boundary data

Only one blk\_gettext/blk\_sendtext loop is required, no matter how many text, image, sensitivity, or boundary columns are being transferred.

**See also**

blk\_init, blk\_sendtext, blk\_colval, blk\_getrow, blk\_gettext

## blk\_sendtext

**Description** A server-side routine, sends text, image, sensitivity, or boundary data in a formatted bulk-copy row obtained from blk\_getrow.

**Syntax** CS\_RETCODE blk\_sendtext(blkdesc, row, buffer,  
buflen)

```
CS_BLKDESC  *blkdesc;  
CS_BLK_ROW  *row;  
CS_BYTE     *buffer;  
CS_INT      buflen;
```

**Parameters**

*blkdesc*

A pointer to the CS\_BLKDESC that is serving as a control block for the bulk-copy operation. blk\_alloc allocates a CS\_BLKDESC structure.

*row*

A pointer to a CS\_BLK\_ROW structure. The CS\_BLK\_ROW structure is a hidden structure that holds formatted bulk-copy rows sent from the client. A gateway application can fill in a CS\_BLK\_ROW structure with a formatted row by calling the blk\_getrow routine.

*buffer*

A pointer to the space from which blk\_sendtext picks up the chunk of text, image, sensitivity, or boundary data.

*buflen*

The length, in bytes, of the *\*buffer* data space.

**Return value**

blk\_sendtext returns:

**Table 4-10: blk\_sendtext return values**

| Returns    | Indicates                                                                                                                                    |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED | The routine completed successfully.                                                                                                          |
| CS_FAIL    | The routine failed.                                                                                                                          |
| CS_PENDING | Asynchronous network I/O is in effect. See the “Asynchronous Programming” topics page in the <i>Open Client Library/C Reference Manual</i> . |

**Usage**

- blk\_sendtext is a client-side routine.
- A gateway application uses blk\_sendtext in conjunction with blk\_gettext. Together, the two routines enable a gateway application to receive chunks of text, image, sensitivity, or boundary data in formatted bulk-copy rows from an Open Client application and send them on to Adaptive Server Enterprise.

- `blk_sendtext` is a gateway-specific substitute for `blk_textxfer`. An application can call `blk_sendtext` only after calling `blk_gettext` to retrieve a chunk of text, image, sensitivity, or boundary data belonging to a formatted row.
- The sequence of calls in the gateway application is:
  - `blk_getrow`, to pick up a formatted bulk-copy row
  - `blk_sendrow`, to send the formatted row to Adaptive Server Enterprise

If `blk_sendrow` returns `CS_BLK_HAS_TEXT`, the application must call the following routines in a loop, until `blk_gettext` returns `CS_END_DATA`:

- `blk_gettext`, to pick up a chunk of text, image, sensitivity, or boundary data
- `blk_sendtext`, to send a chunk of text, image, sensitivity, or boundary data

Only one `blk_gettext/blk_sendtext` loop is required, no matter how many text, image, sensitivity, or boundary columns are being transferred.

See also `blk_init`, `blk_sendrow`, `blk_colval`, `blk_getrow`, `blk_gettext`

## blk\_srvinit

|             |                                                                                                                                                                                                                                                                                        |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description | A server-side routine, copies descriptions of server table columns to the client, if required.                                                                                                                                                                                         |
| Syntax      | <pre>CS_RETCODE blk_srvinit(srvproc, blkdesc)  SRV_PROC      *srvproc; CS_BLKDESC   *blkdesc;</pre>                                                                                                                                                                                    |
| Parameters  | <p><i>srvproc</i></p> <p>A pointer to the <code>SRV_PROC</code> structure associated with the client receiving column descriptions. It contains all the information that Server-Library uses to manage communications and data between the Open Server application and the client.</p> |

*blkdesc*

A pointer to a structure containing information about bulk-copy data. This structure must have been previously allocated with a call to `blk_alloc` and initialized through a call to `blk_init`. This structure is used to correctly interpret incoming formatted bulk-copy rows.

Return value `blk_srvinit` returns:

| Returns    | Indicates                                |
|------------|------------------------------------------|
| CS_SUCCEED | The routine completed successfully.      |
| CS_FAIL    | The routine failed; no action was taken. |

- Usage
- `blk_srvinit` is a server-side routine that is useful in gateway applications.
  - This routine sends the current server table column descriptions in the `CS_BLKDESC` structure to the client, if the client's TDS version is 5.0 or later.
  - This routine must be called from within a `SRV_LANGUAGE` event handler, in response to an "insert bulk" request from the client.
  - Once `blk_srvinit` has successfully returned descriptions to the client, the Open Server application's `SRV_BULK` event handler can begin reading bulk data from the client. The event handler first calls `blk_rowalloc`, then calls `blk_getrow` and `blk_sendrow` in a loop to transfer the bulk-copy rows.
  - `blk_init` places the descriptions in the `CS_BLKDESC` structure, so the gateway application must call `blk_init` before calling `blk_srvinit`.

See also `blk_init`, `blk_getrow`, `blk_rowalloc`, `blk_sendrow`

## **blk\_textxfer**

Description Transfers a column's data in chunks during a bulk-copy operation.

Syntax `CS_RETCODE blk_textxfer(blkdesc, buffer, buflen, outlen)`

```
CS_BLKDESC  *blkdesc;
CS_BYTE     *buffer;
CS_INT      buflen;
CS_INT      *outlen;
```



- Parameters**
- blkdesc*  
A pointer to the CS\_BLKDESC that is serving as a control block for the bulk-copy operation. *blk\_alloc* allocates a CS\_BLKDESC structure.
- buffer*  
A pointer to the space from which *blk\_textxfer* picks up the chunk of text, image, sensitivity, or boundary data.
- buflen*  
The length, in bytes, of the *\*buffer* data space.
- outlen*  
A pointer to an integer variable. *outlen* is not used for a bulk-copy-in operation and should be passed as NULL.  
  
For a bulk-copy-out operation, *\*outlen* represents the length, in bytes, of the data copied to *\*buffer*.

**Return value** *blk\_textxfer* returns:

**Table 4-11: *blk\_textxfer* return values**

| Returns     | Indicates                                                                                                                                                                                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS_SUCCEED  | The routine completed successfully.                                                                                                                                                                                                                                                                        |
| CS_FAIL     | The routine failed.                                                                                                                                                                                                                                                                                        |
| CS_END_DATA | When copying data out from a database, <i>blk_textxfer</i> returns CS_END_DATA to indicate that a complete column value has been sent.<br><br>When copying data into a database, <i>blk_textxfer</i> returns CS_END_DATA when an amount of data equal to <i>blk_bind</i> 's <i>*datalen</i> has been sent. |
| CS_PENDING  | Asynchronous network I/O is in effect. See the "Asynchronous Programming" topics page in the <i>Open Client Client-Library/C Reference Manual</i> .                                                                                                                                                        |

### Examples

```

/*
** BulkCopyIn()
**
** BLKDATA and DATA_END are defined in the bulk copy
** example program.
*/

CS_STATIC CS_RETCODE
BulkCopyIn(connection)
CS_CONNECTION *connection;
{

```

```
CS_BLKDESC    *blkdesc;
CS_DATAFMT    datafmt;      /* variable descriptions */
Blk_Data      *dptr;        /* data for transfer */
CS_INT        datalen[5];   /* variable data length */
CS_INT        len;
CS_INT        numRows;

/*
** Ready to start the bulk copy in now that all the
** connections have been made and have a table name.
** Start by getting the bulk descriptor initializing.
*/
...CODE DELETED.....

/* Bind columns and transfer rows */
dptr = BLKDATA;
while (dptr->pub_id != DATA_END)
{
    datafmt.datatype = CS_INT_TYPE;
    datafmt.count = 1;
    datafmt.maxlength = sizeof(CS_INT);
    datalen[0] = CS_UNUSED;

    if (blk_bind(blkdesc, 1, &datafmt, &dptr->pub_id,
                &datalen[0], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(1) failed");
        return CS_FAIL;
    }
    datafmt.datatype = CS_CHAR_TYPE;
    datafmt.maxlength = MAX_PUBNAME - 1;
    datalen[1] = strlen(dptr->pub_name);
    if (blk_bind(blkdesc, 2, &datafmt, dptr->pub_name,
                &datalen[1], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(2) failed");
        return CS_FAIL;
    }
    datafmt.maxlength = MAX_PUBCITY - 1;
    datalen[2] = strlen(dptr->pub_city);
    if (blk_bind(blkdesc, 3, &datafmt, dptr->pub_city,
                &datalen[2], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(3) failed");
        return CS_FAIL;
    }
}
```

```

    datafmt.maxlength = MAX_PUBST - 1;
    datalen[3] = strlen(dptr->pub_st);
    if (blk_bind(blkdesc, 4, &datafmt, dptr->pub_st,
                &datalen[3], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(4) failed");
        return CS_FAIL;
    }
    datafmt.datatype = CS_TEXT_TYPE;
    datafmt.maxlength = MAX_BIO - 1;
    datalen[4] = strlen((char *)dptr->pub_bio);
    if (blk_bind(blkdesc, 5, &datafmt, NULL,
                &datalen[4], NULL) != CS_SUCCEED)
    {
        ex_error("BulkCopyIn: blk_bind(5) failed");
        return CS_FAIL;
    }
    if (blk_rowxfer (blkdesc) == CS_FAIL)
    {
        ex_error("BulkCopyIn: EX_BLK - Failed on \
                blk_rowxfer.");
        return CS_FAIL;
    }
    if (blk_textxfer(blkdesc, dptr->pub_bio,
                    datalen[4], &len) == CS_FAIL)
    {
        ex_error("BulkCopyIn: blk_rowxfer() failed");
        return CS_FAIL;
    }
    dptr++;
}
/* ALL the rows sent so clear up */
...CODE DELETED....

return CS_SUCCEED;
}

```

**Usage**

- `blk_textxfer` is a client-side routine.
- `blk_textxfer` transfers large text or image values. `blk_textxfer` does not perform any data conversion; it simply transfers data.
- There are two ways for an application to transfer text and image values during a bulk-copy operation:

- The application can treat text or image data like ordinary data: that is, it can bind columns to program variables and transfer rows using `blk_rowxfer_mult`. Generally, this method is convenient for small text and image values but not for larger ones. If the entire value is to be transferred by `blk_rowxfer_mult`, the application must allocate program variables that are large enough to hold entire column values.
- Using `blk_textxfer`, the application can transfer text or image data in chunks. This method allows the application to use a transfer buffer that is smaller than the values to be transferred.
- An application marks a column for transfer through `blk_textxfer` by calling `blk_bind` for the column with a NULL *buffer* parameter. If the transfer is going into the database, pass the total length of the value as `blk_bind`'s *\*datalen* parameter.
- See Chapter 3, "Bulk-Library."

#### Using *blk\_textxfer* for bulk-copy-in operations

- An application's `blk_bind` calls do not have to be in column order, but data for `blk_textxfer` columns must be transferred in column order.

For example, an application can bind columns 3 and 4, and then mark columns 2 and 1 for transfer using `blk_textxfer`. After calling `blk_rowxfer_mult` to copy data for columns 3 and 4, the application needs to call `blk_textxfer` to transfer data for column 1 before calling it for column 2.

- When copying data into a database, if a text, image, boundary, or sensitivity datatype column is marked for transfer using `blk_textxfer`, all subsequent columns of these types must also be marked for transfer using `blk_textxfer`.

For example, an application cannot mark the first text column in a row for transfer using `blk_textxfer` and then bind a subsequent text column to a program variable.

- When copying data into a database, an application is responsible for calling `blk_textxfer` the correct number of times to transfer the complete text or image value.

#### Using *blk\_textxfer* for Bulk-Copy-Out operations

- When using `blk_textxfer` to copy data out of a database, only columns that follow bound columns are available for transfer using `blk_textxfer`. In other words, columns being transferred using `blk_textxfer` must reside at the end of row.

For example, an application cannot bind the first two columns in a row to program variables, mark the third for transfer using `blk_textxfer`, and bind the fourth.

- When copying data out from a database, `blk_textxfer` returns `CS_END_DATA` to indicate that a complete column value has been copied.

See also

`blk_bind`, `blk_rowxfer_mult`



# Error Messages

## Memory allocation failed

|                                    |                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open Server/SDK component affected | Open Client                                                                                                                                                                                                                                                                                                                                                    |
| Error number                       | 2                                                                                                                                                                                                                                                                                                                                                              |
| Message text                       | Memory allocation failure.                                                                                                                                                                                                                                                                                                                                     |
| Possible cause                     | The Client-Library application is unable to allocate memory to store information read from a configuration file.                                                                                                                                                                                                                                               |
| Action                             | <ul style="list-style-type: none"> <li>• Check the amount of memory currently available to your application on your machine.</li> <li>• Increase physical or virtual memory.</li> <li>• Exit other applications to free up resources.</li> <li>• Monitor memory usage of the application periodically to check if there is a potential memory leak.</li> </ul> |
| Additional information             | N/A                                                                                                                                                                                                                                                                                                                                                            |
| Versions                           | Client-Library 10.0.x and later                                                                                                                                                                                                                                                                                                                                |

## Unable to open configuration file

|                                    |                                                                                                                                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open Server/SDK component affected | Open Client                                                                                                                                                                                       |
| Error number                       | 3                                                                                                                                                                                                 |
| Message text                       | Unable to open configuration file %1! for reading.                                                                                                                                                |
| Possible cause                     | The application is unable to open the specified configuration file.                                                                                                                               |
| Action                             | <ul style="list-style-type: none"> <li>• Check the path and permission for the specified configuration file.</li> <li>• Ensure that no other process is currently writing to the file.</li> </ul> |

|                        |                                 |
|------------------------|---------------------------------|
| Additional information | N/A                             |
| Versions               | Client-Library 10.0.x and later |

## **Configuration has been dropped**

|                                    |                                                      |
|------------------------------------|------------------------------------------------------|
| Open Server/SDK component affected | N/A                                                  |
| Error number                       | 4                                                    |
| Message text                       | Configuration %1! has been dropped (CS_FORCE) .      |
| Possible cause                     | Due to a bug, this error is not displayed currently. |
| Action                             | N/A                                                  |
| Additional information             | N/A                                                  |
| Versions                           | N/A                                                  |

## **Configuration file name too long**

|                                    |                                                      |
|------------------------------------|------------------------------------------------------|
| Open Server/SDK component affected | N/A                                                  |
| Error number                       | 5                                                    |
| Message text                       | Configuration file name %1! too long.                |
| Possible cause                     | Due to a bug, this error is not displayed currently. |
| Action                             | N/A                                                  |
| Additional information             | N/A                                                  |
| Versions                           | N/A                                                  |



## File format error

|                                    |                                                                                              |
|------------------------------------|----------------------------------------------------------------------------------------------|
| Open Server/SDK component affected | Open Client                                                                                  |
| Error number                       | 6                                                                                            |
| Message text                       | <code>File format error, invalid character line %1!</code>                                   |
| Possible cause                     | An invalid multi-byte character is detected while reading the specified configuration file.  |
| Action                             | Verify that the correct multi-byte character is entered in the specified configuration file. |
| Additional information             | N/A                                                                                          |
| Versions                           | Client-Library 10.0.x and later                                                              |

## Configuration section not found

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open Server/SDK component affected | Open Client                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Error number                       | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Message text                       | <code>Configuration section %1! not found.</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Possible cause                     | The section name or included section name is not found in the specified configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Action                             | Create a section for the section name or included section name in the specified configuration file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Additional information             | <p>Open Client allows you to use runtime configuration files for Client-Library applications. There is no default runtime configuration file included with your software. Therefore, you must create your own configuration file if you need to use one. You can create, place, and name configuration files as needed. However, when an Open Client application is launched, by default Open Client looks for a configuration file named <i>ocs.cfg</i> under the <i>config</i> subdirectory of the Open Client directory. If the file exists, Open Client expects to find the configuration information for the application in it.</p> <p>The runtime configuration file is separated into sections where each section contains one or more settings, as illustrated below:</p> <p style="text-align: center;">[section name]</p> |

```
keyword = value ; comment
keyword = value
; more comments
[next section name]
... and so forth...
```

A section can include the keywords in another section using this syntax:

```
[section
name]
include = previous
section name
... more settings...
```

Versions Client-Library 10.0.x and later

## Configuration file syntax error

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open Server/SDK component affected | Open Client                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Error number                       | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Message text                       | Configuration file syntax error line %1! near (%2!).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Possible cause                     | A syntax error occurred in the specified configuration file. For example, section name is not wrapped in square brackets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Action                             | Locate and correct the error in the configuration file at the specified line number near the specified string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Additional information             | <p>Open Client allows you to use runtime configuration files for Client-Library applications. There is no default runtime configuration file included with your software. Therefore, you must create your own configuration file if you need to use one. You can create, place, and name configuration files as needed. However, when an Open Client application is launched, by default Open Client looks for a configuration file named <i>ocs.cfg</i> under the <i>config</i> subdirectory of the Open Client directory. If the file exists, Open Client expects to find the configuration information for the application in it.</p> <p>The runtime configuration file is separated into sections where each section contains one or more settings, as illustrated below:</p> |

```
[section name]
```

```
keyword = value ; comment
keyword = value
; more comments
[next section name]
... and so forth...
```

Versions N/A

## Configuration was dropped while still in use

Open Server/SDK component affected N/A

Error number 9

Message text Configuration %1! was dropped (CS\_FORCE) while still in use.

Possible cause Not used in current versions of Open Client.

Action N/A

Additional information N/A

Versions N/A

*Configuration was dropped while still in use*

---

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