

G2-Sybase Bridge

Release Notes
Version 12.0 Rev. 1



G2-Sybase Bridge Release Notes, Version 12.0 Rev. 1

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Preface

Describes these release notes and the conventions that they use.

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About these Notes

These Release Notes:

- Explain how to install your G2-Sybase Bridge, and how to establish connections to the database and communicate with it. This information is unique to Sybase and is not included in the *G2 Database Bridge User's Guide*.
- Describe the system requirements for this release.
- Give information on all new and changed bridge features.

Audience

To use this manual, you must have at least a limited knowledge of G2, and a thorough understanding of the database system that you want to connect to G2.

Conventions

This guide uses the following typographic conventions and conventions for defining system procedures.

Typographic

Convention Examples	Description
g2-window, g2-window-1, ws-top-level, sys-mod	User-defined and system-defined G2 class names, instance names, workspace names, and module names
history-keeping-spec, temperature	User-defined and system-defined G2 attribute names
true, 1.234, ok, "Burlington, MA"	G2 attribute values and values specified or viewed through dialogs
Main Menu > Start KB Workspace > New Object create subworkspace Start Procedure	G2 menu choices and button labels
conclude that the x of y ...	Text of G2 procedures, methods, functions, formulas, and expressions
<i>new-argument</i>	User-specified values in syntax descriptions
<u>text-string</u>	Return values of G2 procedures and methods in syntax descriptions
File Name, OK, Apply, Cancel, General, Edit Scroll Area	GUIDE and native dialog fields, button labels, tabs, and titles
File > Save Properties	GMS and native menu choices
workspace	Glossary terms

Convention Examples	Description
c:\Program Files\Gensym\ /usr/gensym/g2/kbs	Windows pathnames UNIX pathnames
spreadsh.kb	File names
g2 -kb top.kb	Operating system commands
public void main() gsi_start	Java, C and all other external code

Note Syntax conventions are fully described in the *G2 Reference Manual*.

Procedure Signatures

A procedure signature is a complete syntactic summary of a procedure or method. A procedure signature shows values supplied by the user in *italics*, and the value (if any) returned by the procedure underlined. Each value is followed by its type:

```
g2-clone-and-transfer-objects
(list: class item-list, to-workspace: class kb-workspace,
 delta-x: integer, delta-y: integer)
-> transferred-items: g2-list
```

Related Documentation

G2 Core Technology

- *G2 Bundle Release Notes*
- *Getting Started with G2 Tutorials*
- *G2 Reference Manual*
- *G2 Language Reference Card*
- *G2 Developer's Guide*
- *G2 System Procedures Reference Manual*

- *G2 System Procedures Reference Card*
- *G2 Class Reference Manual*
- *Telewindows User's Guide*
- *G2 Gateway Bridge Developer's Guide*

G2 Utilities

- *G2 ProTools User's Guide*
- *G2 Foundation Resources User's Guide*
- *G2 Menu System User's Guide*
- *G2 XL Spreadsheet User's Guide*
- *G2 Dynamic Displays User's Guide*
- *G2 Developer's Interface User's Guide*
- *G2 OnLine Documentation Developer's Guide*
- *G2 OnLine Documentation User's Guide*
- *G2 GUIDE User's Guide*
- *G2 GUIDE/UII Procedures Reference Manual*

G2 Developers' Utilities

- *Business Process Management System Users' Guide*
- *Business Rules Management System User's Guide*
- *G2 Reporting Engine User's Guide*
- *G2 Web User's Guide*
- *G2 Event and Data Processing User's Guide*
- *G2 Run-Time Library User's Guide*
- *G2 Event Manager User's Guide*
- *G2 Dialog Utility User's Guide*
- *G2 Data Source Manager User's Guide*
- *G2 Data Point Manager User's Guide*
- *G2 Engineering Unit Conversion User's Guide*
- *G2 Error Handling Foundation User's Guide*
- *G2 Relation Browser User's Guide*

Bridges and External Systems

- *G2 ActiveXLink User's Guide*
- *G2 CORBALink User's Guide*
- *G2 Database Bridge User's Guide*
- *G2-ODBC Bridge Release Notes*
- *G2-Oracle Bridge Release Notes*
- *G2-Sybase Bridge Release Notes*
- *G2 JMail Bridge User's Guide*
- *G2 Java Socket Manager User's Guide*
- *G2 JMSLink User's Guide*
- *G2 OPCLink User's Guide*
- *G2 PI Bridge User's Guide*
- *G2-SNMP Bridge User's Guide*
- *G2 CORBALink User's Guide*
- *G2 WebLink User's Guide*

G2 JavaLink

- *G2 JavaLink User's Guide*
- *G2 DownloadInterfaces User's Guide*
- *G2 Bean Builder User's Guide*

G2 Diagnostic Assistant

- *GDA User's Guide*
- *GDA Reference Manual*
- *GDA API Reference*

Customer Support Services

You can obtain help with this or any Gensym product from Gensym Customer Support. Help is available online, by telephone and by email.

To obtain customer support online:

➔ Access Ignite Support Portal at <https://support.ignitetechnology.com>.

You will be asked to log in to an existing account or create a new account if necessary. Ignite Support Portal allows you to:

- Register your question with Customer Support by creating an Issue.
- Query, link to, and review existing issues.
- Share issues with other users in your group.
- Query for Bugs, Suggestions, and Resolutions.

To obtain customer support by telephone or email:

➔ Use the following numbers and addresses:

United States Toll-Free +1-855-453-8174

United States Toll +1-512-861-2859

Email support@ignitetechnology.com

Overview of the G2-Sybase Bridge

Describes the G2-Sybase Bridge.

Introduction 1

Obtaining Bug Fix Information 1



Introduction

The G2-Sybase Bridge is based on the G2-Database Bridge common architecture. This document supplements the *G2 Database Bridge User's Guide*.

The G2-Sybase Bridge:

- Provides additional features and enhancements to the G2-Sybase Bridge.
- Fixes various bugs in earlier versions of the bridge.

Obtaining Bug Fix Information

This release includes various bug fixes for G2-Sybase Bridge. These fixes are documented in the Dynamic Technical Bulletin, available on G2 HelpLink at:

<http://www.gensym-support.com>

To see a Dynamic Technical Bulletin:

- 1 From the HelpLink home page, choose Product Support > Dynamic Technical Bulletins.
- 2 On that page, choose the product in which you are interested from the drop down list, then click Submit.

-
-
- 3** Choose a report for one of the last three versions of the product by clicking on the icon of the bulletin, or specify a range of bugs fixed between one release and another by using the Starting From Version and Finishing At Version pull-down menu options.

Requirements

Describes the system and 3rd-party requirements of this bridge.

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Introduction

You install the G2-Sybase Bridge as part of the G2 Bundle.

The following version-specific materials comprise G2-Sybase Bridge:

Product	Version
<i>G2 Database Bridge User's Guide</i>	Version 12.0 Rev. 0
<i>G2-Sybase Bridge Release Notes</i>	Version 12.0 Rev. 0
g2-syb150	Version 12.0 Rev. 0
g2-database.kb	Version 12.0 Rev. 0
inst_g2trigs.sql	N/A
deinst_g2trips.sql	N/A

Note To achieve a successful installation, you must use only materials in this release. You must not use materials from previous releases in conjunction with this release or unexpected results may occur.

System Requirements

The following table lists the minimum system requirements to run the G2-Sybase Bridge on your system:

Platform	Operating System	Disk Space
Alpha	HP Tru64 UNIX 5.1A	4.1 MBytes
HP9000	HP-UX 11.0 or 11i V2	4.6 MBytes
RS6000	AIX 5L V5.2	5.6 MBytes
Sparc	Solaris 2.6	4.5 MBytes
Windows	Server 2010, Server 2008 R2, Server 2008, 10, 8.1, 7	2.1 MBytes

Release Compatibility

G2-Sybase Bridge Version 12.0 Rev. 0 has specific compatibility requirements with G2 and Sybase.

It is not necessary to have a separately installed G2 Gateway to run this version of the bridge.

G2

The G2 bridges ship with a bridge KB named `g2-database.kb`, which will load with G2 Version 6.x or later on any platform where G2 is supported.

To load the bridge KBs into G2, it must be authorized with the Online option or similar G2 Gateway and ICP options.

Sybase

The G2-Sybase Bridge provides two executables:

- `g2-syb11` – This bridge requires the Sybase 11.1 libraries. In prior releases, this bridge executable was called `g2-sybase`.

This bridge executable is built with Sybase Version 11.1 client, and will communicate with 11.1 or newer 11.x versions of Sybase Open SQL Server.

At a minimum, you must have the following Sybase products installed on your system prior to running the bridge:

- Language Modules, Version 11.1.0+
- Open Client/C, Version 11.1.0+

- `g2-syb125` – This bridge executable requires the Sybase 12.5 libraries. This bridge will not work with Sybase 11 and Sybase 12.0 servers.

This bridge executable is built with Sybase Version 12.5 client, and will communicate with 12.5 versions of Sybase Open SQL Server.

At a minimum, you must have the following Sybase products installed on your system prior to running the bridge:

- Language Modules, Version 12.5
- Open Client/C, Version 12.5

- `g2-syb150` – This bridge requires the Sybase 15.7 libraries. In prior releases, this bridge executable was called `g2-sybase`.

This bridge executable is built with Sybase Version 15.7 client, and will communicate with 15.7 or newer 15.x versions of Sybase Adaptive Server Enterprise.

At a minimum, you must have the following Sybase products installed on your system prior to running the bridge:

- Language Modules, Version 15.7.0+
- Open Client/C, Version 15.7.0+

Release Features

Describes the new features and changes in this release.

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Introduction

This chapter describes the new features and changes in the G2-Sybase Bridge for the last several releases of the bridge.

The following table shows the G2-Sybase Bridge versions that these release notes cover and their corresponding G2 Bundle versions:

G2-Sybase Bridge Version	G2 Bundle Version
Version 12.0 Rev. 0	Version 2015
Version 11.0 Rev. 0	Version 2011
Version 8.3 Rev. 0	Version 8.3 Rev. 0
Version 8.2 Rev. 0	Version 8.2 Rev. 0

G2-Sybase Bridge Version	G2 Bundle Version
Version 7.1 Rev. 0	Version 8.1 Rev. 1
Version 7.1 Rev. 0	Version 8.1 Rev. 0
Version 7.0 Rev. 1	Version 8.0 Rev. 1

G2-Sybase Bridge Version 12.0 Rev. 0

There's no essential changes of G2-Sybase Bridge in this release.

Older G2-Sybase Bridges for Sybase 11 and 12.5 have been removed.

G2-Sybase Bridge Version 11.0 Rev. 0

The G2-Sybase Bridge now supports Sybase Adaptive Server® Enterprise (ASE) 15.x. The new bridge executable is `g2-syb150`. You must use the Sybase 15.x Client software with `g2-syb150`.

Older G2-Sybase Bridges for Sybase 11 and 12.5 are still requiring V8 licenses.

The G2-Sybase Bridge now has both 32-bit and 64-bit versions.

G2-Sybase Bridge Version 8.3 Rev. 0

The G2-Sybase Bridge now requires `sys-mod.kb` and `uilroot.kb`.

The G2-Sybase Bridge supports "smart fetch." For details, see the *G2 Database Bridge User's Guide*.

G2-Sybase Bridge Version 8.2 Rev. 0

G2-Sybase Bridge has been upgraded to Version 8.2 Rev. 0 for the G2 Bundle Version 8.2 Rev. 0. The bridge has been compiled with G2 Gateway Version 8.2.

The G2-Sybase Bridge has two new features, which are available for all G2 Database Bridges:

- `-shutdown_on_disconnect` command-line option.
- Three new attributes on the `g2-database-interface` class for inserting NULLs into tables:
 - `set-null-string`
 - `set-null-number`

- set-null-options

For details, see the *G2 Database Bridge User's Guide*.

G2-Sybase Bridge Version 7.1 Rev. 0

On Windows platforms, you can determine the bridge version without having to run G2 by choosing Properties on the bridge executable file, for example, `g2-sybase.exe`, and clicking the Version tab. The Product Version attribute indicates the bridge version.

G2-Sybase Bridge-Specific Information

Provides information specific to the G2-Sybase database.

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Introduction

This chapter contains G2-Sybase Bridge documentation unique to Sybase and not included in the *G2 Database Bridge User's Guide*. This information is not necessarily related to the release of a new version of the G2-Sybase Bridge.

Connecting to the Database

The bridge may be local or remote to the database. The Sybase connect string is required in both cases, and must be entered in the `database-connect-string` attribute of your `g2-database-interface` object. Also the user name and password must be entered in the `database-user` and `database-password` attributes of the `g2-database-interface` object.

Connecting the Bridge to a Local Database

If the G2-Sybase Bridge is to run on the *same* node as the database server, establish a local connection as follows:

- 1 Enter the database user name into the `database-user` attribute of your `g2-database-interface` object.
- 2 Enter the database password into the `database-password` attribute of your `g2-database-interface` object.
- 3 Enter the server name, which is the name equivalent to the `DSQUERY` environment variable, into the `database-connect-string` of your `g2-database-interface` object.

Connecting the Bridge to a Remote Database

This section describes how to establish a remote connection when the G2-Sybase Bridge is running on a node *different* from the Sybase server node.

For Windows systems, use `sybedit` to make changes to the `sql.ini` file located in your Sybase system install directory.

For all other systems, if the disk drives of the remote machine on which Sybase is installed *are not* accessible to the machine running the bridge:

- 1 Copy the `interfaces` file and the appropriate `charset` and `locales` files from the machine containing the Sybase database to a location accessible by the machine running the bridge, preserving the directory structure. These files are located in the directory associated with the `SYBASE` environment variable for the remote database in question. On some platforms you may also have to copy the `lib` directory and its contents if you receive “unable to initialize client library” errors.

Note You must ensure that the file protections on the copied files are set to allow read and execute access from the account that is running the bridge process.

- 2 Make sure that there is an entry in the *copied* `interfaces` file for the remote machine. Refer to the *Sybase System Administration Guide Supplement* for your platform.
- 3 Define the `SYBASE` environment variable on the machine running the bridge to the directory location of the *copied* `interfaces` file.
- 4 Define the `DSQUERY` environment variable on the machine running the bridge to the name of the Sybase server running on the remote machine.

If the disk drives of the remote machine on which Sybase is installed *are* accessible to the machine running the bridge:

- 1 Define the environment variable on the machine running the bridge to the directory location of the interfaces file.
- 2 Define the environment variable on the machine running the bridge to the name of the Sybase server running on the remote machine.

The database connection attributes of a `g2-database-interface` object might be configured as follows:

G2 Attribute	Value
database-user	"sa"
database-password	"mypassword"
database-connection-string	"SYB_SERVER"

For more information, refer to your Sybase documentation, or call your Sybase Support Organization.

Note For a complete description of how and when to connect to the database from the bridge, see "Configuring Connections" in the *G2 Database Bridge User's Guide*.

Accessing Database Data

Database Character Sets and Text Conversion

The bridge will translate character sets between G2 and the database based on the command line option `-CHARSET`. This functionality is achieved via translator routines that convert G2 internal character sets into character sets utilized by database vendors. For a list of supported character sets, refer to "Chapter 4, Running the Bridge" in the *G2 Database Bridge User's Guide*.

Bind Variables

Every SQL statement must be parsed and an execution plan must be chosen for it before it can be executed. These parsed SQL statements are held in a Sybase memory area called the library cache. Statements in the library cache will be reused if identical SQL statements from any user are processed shortly thereafter. To be identical, statements must have exactly the same sequence of characters, including case, spaces, and punctuation.

Certain SQL statements can be made identical by providing place-holders or bind variables. For example, assuming that there is an SQL statement that is designed

to insert an employee name into the database, the only element in the SQL statement that will change will be the employee name. For example:

```
insert into employees values ('Smith')
insert into employees values ('Jones')
```

may be replaced by one statement as follows:

```
insert into employees values (?)
```

where ? represents an input bind variable. The following pseudo-code example illustrates the new implementation:

```
? = 'Smith'
insert into employees values (?)
? = 'Jones'
insert into employees values (?)
```

The database does not reprocess each of these insert statements since they are identical. The database will replace the bind variable ? with the bind-variable value at runtime. This same approach may be applied to query statements. Writing reusable SQL code will substantially improve the performance of the Sybase library cache.

Note Bind variables are denoted by the ? character.

Stored Procedure Support

The G2-Sybase Bridge provides limited support for calling procedures stored in the database. You may execute a stored procedure, but the stored procedure must *not* attempt to return values. If you wish to obtain values, write the results to a database table and then perform a separate query to obtain them.

Sybase treats the "SELECT @x = <value>" as an assignment statement. Normally this command silently assigns <value> to @x. However, if @x is a stored procedure OUTPUT parameter, Sybase displays the value as well as assigning it. This will cause the stored procedure that was invoked by the G2-Sybase Bridge to fail. Therefore, the db-exec-stored-proc-return procedure is not supported in Sybase.

Although stored procedures may not return any data values to G2, standard information about the success or failure of the stored procedure call can be returned to G2 in the form of status codes, messages, etc. Stored procedures may be called by executing the G2 procedure db-exec-stored-proc.

For example, for a database stored procedure named `add_name`, you might have the following lines in one of your G2 procedures:

```
sql-stmt = "execute procedure add_name ('Gensym)";
status,code,msg,nrows = call db-exec-stored-proc ( sql-stmt );
```

Event Notification through Triggers

Triggers provide the capability for G2 to respond to events occurring in the database. Triggers are defined by the database administrator on specific database objects such as tables. Trigger messages are conveyed to G2 via two methods:

- Messages to a G2 procedure.
- Updates to a trigger object.

Up to 50 triggers may be set per bridge process. Please refer to the *G2 Database Bridge User's Guide* for details on how to set triggers.

Sybase does not provide a means for exporting trigger events from the database to an external process. Because of this limitation, the G2-Sybase Bridge provides a solution for implementing triggers using a trigger table and a database stored procedure. This solution utilizes a polling approach to check for trigger events which are stored in a special trigger table called `g2_triggers_tbl`.

For example:

trig_id numeric identity	trig_name varchar(30)	trig_datetime datetime	trig_msg varchar(200)
1	TEST_TRIG1	Jan 1 1997 12:00AM	Trigger 1 has fired
2	TEST_TRIG1	Jan 1 1997 12:10AM	Trigger 1 has fired
3	TEST_TRIG2	Jan 1 1997 12:30AM	Trigger2 has fired

Each time a trigger fires that you want G2 to monitor, a database procedure is invoked that inserts a row into the `g2_trigger_tbl` table. The bridge continually monitors the table by calling another database procedure `g2_return_trigger` to select a row from `g2_trigger_tbl` based on the trigger name supplied by G2. If the procedure finds a match, it sends the message, supplied by your trigger, and the timestamp back to G2, and deletes the row from the database table.

In order for this mechanism to function properly, the bridge must set the Sybase database transaction mode to `chained off` for every database connection that will process triggers. Specify:

```
set chained off
```

By setting chained mode off, each non-query operation performed on the database is treated as a separate transaction that requires either a commit or rollback. Sybase recommends that you do not mix transaction modes in applications, and states "The behavior of batches, stored procedures, and triggers can vary depending on the mode."

For more details on setting transaction modes, see the *Sybase SQL Server Transaction-Mode User's Guide*.

If you register a trigger by calling `db-set-trigger` and the transaction mode is set to chained on, the following error message will appear repeatedly in the bridge console window:

```
G2-SYBASE: <interface-name>: ERROR: -7713 Stored
procedure 'g2_process_trig_proc' may only be run
in unchained transaction mode.
```

Gensym recommends using one of the following two methods for monitoring trigger events with the bridge:

- 1 Run one bridge process with one or more interface objects connected to the Sybase database. If using more than one `g2-database interface` object, set up one interface object to handle triggers exclusively. Each connection to the database *must* have the transaction mode set to unchained. There is a risk of database deadlocks and other side effects if any of the connections are set to chained transaction mode.
- 2 Run more than one bridge process. Set up one bridge to handle only the triggers. Run separate bridge processes to handle all other SQL transactions. The non-trigger bridge processes can have a transaction mode set to chained. However, you must remember to perform commits and rollbacks, as appropriate, to avoid locking the bridge that is handling the triggers.

Trigger Installation

In order to monitor triggers with the bridge, the SQL script file `inst_g2trigs.sql` must be run to create the trigger table and database stored procedures. The following database objects will be created:

Object	Type	Function
<code>g2_triggers_tbl</code>	table	Stores executed trigger messages and time stamps.

Object	Type	Function
g2_insert_trig_proc	procedure	Inserts entries into the trigger table g2_triggers_tbl.
g2_process_trig_proc	procedure	Returns the trigger to G2 and removes the entry from the trigger table g2_triggers_tbl.

The script may be executed from *isql* as follows:

```
isql -Uusername -Ppassword -Sservername -iinst_g2trigs.sql
```

For example, to install triggers on a server named *my_server*, enter:

```
isql -Usa -P -Smy_server -iinst_g2trigs.sql
```

To use this mechanism, any triggers that you want to monitor with the bridge must be modified to call the database procedure *g2_process_trigger* at the end of the trigger. The database procedure takes two arguments, the name of the trigger and a message up to 200 characters in length. The timestamp field is filled in automatically with the current date and time.

For example, to modify a user-defined trigger named *test_trig1*, the following lines in boldface must be added to the trigger:

```
CREATE TRIGGER test_trig1 ON authors FOR update
AS
DECLARE @retcode int
IF EXISTS (SELECT id FROM sysobjects WHERE name = 'g2_triggers_
tbl')
EXECUTE @retcode = g2_insert_trig_proc "test_trig1", "Trigger 1
has fired"
```

Trigger Deinstallation

To delete the trigger table and database procedures, the script file *deinst_g2trigs.sql* can be run from within *isql* as follows:

```
isql -Uusername -Ppassword -Sservername -ideinst_g2trigs.sql
```

For example, to deinstall triggers on a server named *my_server*, enter:

```
isql -Usa -P -Smy_server -ideinst_g2trigs.sql
```

Commit and Rollback

Transaction modes effect the behavior of commit and rollback. Sybase supports two transaction modes:

- Unchained is the default mode and requires an explicit begin transaction statement paired with a commit or a rollback to complete a transaction.
- Chained mode is the ANSI-compatible transaction mode that implicitly begins a transaction before any data retrieval or modification statement. These statements include: delete, insert, open, fetch, select and update. You must explicitly end the transaction with commit or rollback.

Note If you utilize unchained mode without an explicit begin transaction statement, you will not be able to rollback transactions.

Please consult your Sybase documentation for details on the use and ramifications of these transaction modes. Transaction modes greatly effect the functionality of your application and triggers.

Column Attribute Naming and Aliases

Sybase supports column name aliases in queries. The alias is specified in your select list after the column name and before the comma. You may specify the alias in single quotes or without quotes:

```
"select au_lname last_name, postalcode zip from authors"
```

In this example, the value from the database column `au_lname` will be returned to the query object column attribute named `last_name`, and the value from the database column `postalcode` will be returned to a query object column attribute named `zip`. For more information on using column aliases, reference your *Sybase SQL Server Reference Manual*.

A database column must not conflict with a G2 reserved word. If there are conflicts, you can use aliases or you can use database views to redefine the result table column names.

When performing SQL functions such as *max*, *min*, *sum*, *avg*, and *count* from within queries using query objects, the bridge will return the result values to query object column attributes of the same name as the column having the function performed on it, or you may specify a column alias. Be sure the column attribute in the query object is defined with the proper data type for the result value.

The bridge may not be able to determine the column names from certain nested or complex function calls. This will result in no data being returned to the query object table, while the db-rows-processed value indicates that data has been

returned. In this case, it is recommended that you utilize aliases to set the appropriate column name.

Context-Based Immediate Cursor-Close Option

To reduce the persistence of shared table locks associated with the opening of database cursors, the G2-Sybase Bridge provides support for immediately closing an open cursor, releasing any table locks. This feature works under the following conditions:

- The `NOHOLDLOCK` keyword is used within the query to set the transaction isolation level to 1. Alternatively, the transaction isolation level can be set to 1 explicitly for the entire session by issuing the following:

```
set transaction isolation level 1
```

- A query transaction has encountered an end-of-cursor status or an error occurs while fetching a row in the query.
- A cursor has been refreshed via the `db-refresh-cursor` API procedure.
- A G2 query-object is deleted, disabled, or deactivated.
- The database connection or bridge process is terminated.

This option is available on a per context basis, for example, per database connection. It is enabled by specifying “-x” for the `remote-process-initialization-string` attribute of each `g2-database-interface` object for which this capability is required.

To use this feature effectively, you must use the `NOHOLDLOCK` option in every select statement. This option prevents Sybase from holding any shared locks acquired during the execution of the query, regardless of the transaction isolation level currently in effect.

For example, if the default transaction isolation level is set to 3, which would normally cause a select query to hold locks until the end of a transaction (when, for example, a commit or rollback is issued), the following command would release the locks when the query completes:

```
select balance from account NOHOLDLOCK where acct_number < 100
```

At transaction isolation level 3, Sybase uses shared or update locks on any base table or leaf-level index pages that have been read into a transaction through the cursor. Sybase holds the locks until the transaction ends via commit or rollback. *It does not release the locks when the data page is no longer needed or when the cursor is closed.*

Note By using the context-based immediate cursor closed option in conjunction with the NOHOLDLOCK keyword in every select statement, the query locks will be released when the cursor is closed.

This option will not close a cursor if batch fetching is being utilized and an end-of-cursor status has not been encountered. However, when the end-of-cursor status is finally attained, the cursor will be closed. Therefore, the lock will persist until the query has completed or a commit or rollback is executed.

This option is particularly useful if sequential transactions will be referencing the same database data; in particular, when a shared-intent lock is being held on a table and another transaction attempts to acquire an exclusive table lock on the same table.

For more information on database locks and the commands that can affect locks, please refer to Chapter 5 located at the following URL:

<http://sybooks.sybase.com/dynaweb/group2/asg1150e/perform>

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