

# **Oracle® Transparent Gateway for Sybase**

Administrator's Guide

10g Release 2 (10.2) for HP-UX

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Oracle Transparent Gateway for Sybase Administrator's Guide, 10g Release 2 (10.2) for HP-UX

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# Preface

This manual describes the Oracle Transparent Gateway for Sybase, which enables Oracle client applications to access Sybase data through Structured Query Language (SQL). The gateway, with the Oracle database server, creates the appearance that all data resides on a local Oracle database server, even though the data can be widely distributed.

This preface covers the following topics:

- [Audience](#)
- [Documentation Accessibility](#)
- [Related Documents](#)
- [Conventions](#)

## Audience

This manual is intended for Oracle database administrators who perform the following tasks:

- Installing and configuring the Oracle Transparent Gateway for Sybase
- Diagnosing gateway errors
- Using the gateway to access Sybase data

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**Note:** You should understand the fundamentals of transparent gateways and the HP-UX operating system before using this guide to install or administer the gateway.

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## **Related Documents**

For more information, see these Oracle resources:

- *Oracle Database New Features*
- *Oracle Call Interface Programmer's Guide*
- *Oracle Enterprise Manager Administrator's Guide*
- *Oracle Database Administrator's Guide*
- *Oracle Database Application Developer's Guide - Fundamentals*
- *Oracle Database Concepts*
- *Oracle Database Performance Tuning Guide*
- *Oracle Database Error Messages*
- *Oracle Database Globalization Support Guide*
- *Oracle Database Reference*
- *Oracle Database SQL Reference*
- *Oracle Database Net Services Administrator's Guide*
- *SQL\*Plus User's Guide and Reference*
- *Oracle Database Heterogeneous Connectivity Administrator's Guide*
- *Oracle Database 2 Day DBA*
- *Oracle Database Security Guide*

Many of the examples in this book use the sample schemas of the seed database, which is installed by default when you install Oracle. Refer to *Oracle Database Sample Schemas* for information on how these schemas were created and how you can use them yourself.

## **Conventions**

This section describes the conventions used in the text and code examples of this documentation set. It describes:

- [Conventions in Text](#)
- [Conventions in Code Examples](#)

## Conventions in Text

We use various conventions in text to help you more quickly identify special terms. The following table describes those conventions and provides examples of their use.

Convention	Meaning	Example
<b>Bold</b>	Bold typeface indicates terms that are defined in the text or terms that appear in a glossary, or both.	When you specify this clause, you create an <b>index-organized table</b> .
<i>Italics</i>	Italic typeface indicates book titles or emphasis.	<i>Oracle Database Concepts</i> Ensure that the recovery catalog and target database do <i>not</i> reside on the same disk.
UPPERCASE monospace (fixed-width) font	Uppercase monospace typeface indicates elements supplied by the system. Such elements include parameters, privileges, datatypes, RMAN keywords, SQL keywords, SQL*Plus or utility commands, packages and methods, as well as system-supplied column names, database objects and structures, usernames, and roles.	You can specify this clause only for a NUMBER column. You can back up the database by using the BACKUP command. Query the TABLE_NAME column in the USER_TABLES data dictionary view. Use the DBMS_STATS.GENERATE_STATS procedure.
lowercase monospace (fixed-width) font	Lowercase monospace typeface indicates executables, filenames, directory names, and sample user-supplied elements. Such elements include computer and database names, net service names, and connect identifiers, as well as user-supplied database objects and structures, column names, packages and classes, usernames and roles, program units, and parameter values. <b>Note:</b> Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown.	Enter sqlplus to open SQL*Plus. The password is specified in the orapwd file. Back up the datafiles and control files in the /disk1/oracle/dbs directory. The department_id, department_name, and location_id columns are in the hr.departments table. Set the QUERY_REWRITE_ENABLED initialization parameter to true. Connect as oe user. The JRepUtil class implements these methods.
<i>lowercase italic monospace (fixed-width) font</i>	Lowercase italic monospace font represents placeholders or variables.	You can specify the <i>parallel_clause</i> . Run <i>Uold_release</i> .SQL where <i>old_release</i> refers to the release you installed prior to upgrading.

## Conventions in Code Examples

Code examples illustrate SQL, PL/SQL, SQL\*Plus, or other command-line statements. They are displayed in a monospace (fixed-width) font and separated from normal text as shown in this example:

```
SELECT username FROM dba_users WHERE username = 'MIGRATE';
```

The following table describes typographic conventions used in code examples and provides examples of their use.

Convention	Meaning	Example
[ ]	Brackets enclose one or more optional items. Do not enter the brackets.	DECIMAL ( <i>digits</i> [ , <i>precision</i> ])
{ }	Braces enclose two or more items, one of which is required. Do not enter the braces.	{ENABLE   DISABLE}
	A vertical bar represents a choice of two or more options within brackets or braces. Enter one of the options. Do not enter the vertical bar.	{ENABLE   DISABLE} [COMPRESS   NOCOMPRESS]
...	Horizontal ellipsis points indicate either: <ul style="list-style-type: none"> <li>That we have omitted parts of the code that are not directly related to the example</li> <li>That you can repeat a portion of the code</li> </ul>	CREATE TABLE ... AS <i>subquery</i> ;  SELECT <i>col1</i> , <i>col2</i> , ... , <i>coln</i> FROM employees;
. . . .	Vertical ellipsis points indicate that we have omitted several lines of code not directly related to the example.	SQL> SELECT NAME FROM V\$DATAFILE; NAME ----- /fs1/dbs/tbs_01.dbf /fs1/dbs/tbs_02.dbf 
Other notation	You must enter symbols other than brackets, braces, vertical bars, and ellipsis points as shown.	acctbal NUMBER(11,2); acct CONSTANT NUMBER(4) := 3;
<i>Italics</i>	Italicized text indicates placeholders or variables for which you must supply particular values.	CONNECT SYSTEM/ <i>system_password</i> DB_NAME = <i>database_name</i>
UPPERCASE	Uppercase typeface indicates elements supplied by the system. We show these terms in uppercase in order to distinguish them from terms you define. Unless terms appear in brackets, enter them in the order and with the spelling shown. However, because these terms are not case sensitive, you can enter them in lowercase.	SELECT last_name, employee_id FROM employees; SELECT * FROM USER_TABLES; DROP TABLE hr.employees;
lowercase	Lowercase typeface indicates programmatic elements that you supply. For example, lowercase indicates names of tables, columns, or files.  <b>Note:</b> Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown.	SELECT last_name, employee_id FROM employees; sqlplus hr/hr CREATE USER mjones IDENTIFIED BY ty3MU9;

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# Introduction

This chapter introduces the challenge faced by organizations when running several different database systems. It briefly covers Heterogeneous Services, the technology that the Oracle Transparent Gateway for Sybase is based on.

To get a good understanding of generic gateway technology, Heterogeneous Services, Generic Connectivity, and how Oracle Transparent gateways fit in the picture, reading the Oracle Database Heterogeneous Connectivity Administrator's Guide first is highly recommended.

This chapter contains the following sections:

- [Overview](#)
- [Heterogeneous Services Technology](#)
- [Oracle Transparent Gateways](#)

## Overview

Heterogeneous data access is a problem that affects a lot of companies. A lot of companies run several different database systems. Each of these systems stores data and has a set of applications that run against it. Consolidation of this data in one database system is often hard - in large part because many of the applications that run against one database may not have an equivalent that runs against another. Until such time as migration to one consolidated database system is made feasible, it is necessary for the various heterogeneous database systems to interoperate.

Oracle Transparent Gateways provide the ability to transparently access data residing in a non-Oracle system from an Oracle environment. This transparency eliminates the need for application developers to customize their applications to access data from different non-Oracle systems, thus decreasing development efforts and increasing the mobility of the application. Applications can be developed using a consistent Oracle interface for both Oracle and Sybase.

Gateway technology is composed of two parts: a component that has the generic technology to connect to a non-Oracle system, which is common to all the non-Oracle systems, called Heterogeneous Services, and a component that is specific to the non-Oracle system that the gateway connects to. Heterogeneous Services, in conjunction with the Transparent Gateway agent, enables transparent access to non-Oracle systems from an Oracle environment.

## Heterogeneous Services Technology

Heterogeneous Services provides the generic technology for connecting to non-Oracle systems. As an integrated component of the database, Heterogeneous Services can exploit features of the database, such as the powerful SQL parsing and distributed optimization capabilities.

Heterogeneous Services extend the Oracle SQL engine to recognize the SQL and procedural capabilities of the remote non-Oracle system and the mappings required to obtain necessary data dictionary information. Heterogeneous Services provides two types of translations: the ability to translate Oracle SQL into the proper dialect of the non-Oracle system as well as data dictionary translations which displays the metadata of the non-Oracle system in the local format. For situations where no translations are available, native SQL can be issued to the non-Oracle system using the pass-through feature of Heterogeneous Services.

Heterogeneous Services also maintains the transaction coordination between Oracle and the remote non-Oracle system, such as providing the two-phase commit protocol to ensure distributed transaction integrity, even for non-Oracle systems that do not natively support two-phase commit.

**See Also:** Oracle Database Heterogeneous Connectivity Administrator's Guide for more information about Heterogeneous Services.

## Oracle Transparent Gateways

The capabilities, SQL mappings, data type conversions, and interface to the remote non-Oracle system are contained in the gateway. The gateway interacts with Heterogeneous Services to provide the transparent connectivity between Oracle and non-Oracle systems.

The gateway must be installed on a machine running either the Sybase database or the Sybase 32-bit client. This machine can be the same machine as the Oracle database or on the same machine as the Sybase database or on a third machine as a standalone. Each configuration has its advantages and disadvantages. The issues to consider when determining where to install the gateway are network traffic, operating system platform availability, hardware resources and storage.

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## Configuring the Gateway

After installing the gateway, perform the following tasks to configure the gateway for Sybase:

- [Configuring the Gateway](#)
- [Configuring Oracle Net Services Listener for the Gateway](#)
- [Configuring the Oracle Database Server for Gateway Access](#)
- [Creating Database Links](#)
- [Configuring the Gateway for Multiple Sybase Databases](#)
- [Performing Configuration Tasks](#)

### Configuring the Gateway

Perform the following tasks to configure the Oracle Transparent Gateway for Sybase.

#### Task 1: Choose a System Identifier for the Gateway

The gateway system identifier (SID) is an alphanumeric character string that identifies a gateway instance. You need one gateway instance, and therefore one gateway SID, for each Sybase database you are accessing. The SID is used as part of the file name for the initialization parameter file. The default SID is tg4sybs.

You can define a gateway SID, but using the default of tg4sybs is easier because you do not need to change the initialization parameter file name. However, if you want to access two Sybase databases, you need two gateway SIDs, one for each instance of the gateway. If you have one Sybase database and want to access it sometimes with one set of gateway parameter settings, and other times with different gateway parameter settings, you can do that by having multiple gateway SIDs for the single Sybase database.

#### Task 2: Customize the Initialization Parameter File

The initialization parameter file must be available when the gateway is started. During installation, the following default initialization parameter file is created:

```
$ORACLE_HOME/tg4sybs/admin/inittg4sybs.ora
```

Where \$ORACLE\_HOME is the directory under which the gateway is installed.

If you are not using tg4sybs as the gateway SID, you must rename the initialization parameter file using the SID you chose in Task 1. This default initialization parameter

file is sufficient for starting the gateway, verifying a successful installation, and running the demonstration scripts.

In the initialization parameter file, specify the Sybase connection as follows:

```
HS_FDS_CONNECT_INFO=server_name.database_name[, INTERFACE=interface_file]
```

The entries for both the *server\_name* and *database\_name* are case-sensitive. The entry for the *interface\_file* includes the full path and name of the file.

Additionally, set the Sybase environment variable, as follows:

```
Set SYBASE=sybase
```

*sybase* is the directory referred to in the \$SYBASE environment variable (the home of the Sybase software installation).

A number of initialization parameters can be used to modify gateway behavior. You might want to change the initialization parameter file later to meet system requirements.

**See Also:** [Appendix D, "Heterogeneous Services Initialization Parameters"](#) and the *Oracle Database Heterogeneous Connectivity Administrator's Guide* for more information about customizing the initialization parameter file.

## Configuring Oracle Net Services Listener for the Gateway

The gateway requires Oracle Net Services to provide transparent data access. After configuring the gateway, configure Oracle Net Services to work with the gateway.

### Task 1: Configure Oracle Net Services TNS Listener for the Gateway

Oracle Net Services uses the TNS listener to receive incoming connections from a Oracle Net Services client. The TNS listener and the gateway must reside on the same machine.

The TNS listener listens for incoming requests from the Oracle database server. For the TNS listener to listen for the gateway, information about the gateway must be added to the TNS listener configuration file, `listener.ora`. This file is located in `$ORACLE_HOME/network/admin`, where `$ORACLE_HOME` is the directory under which the gateway is installed.

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**Note:** If Oracle Net Services is reinstalled, the original `listener.ora` file is renamed and a new `listener.ora` file is put into the `$ORACLE_HOME/network/admin` directory.

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The following entries must be added to the `listener.ora` file:

- A list of Oracle Net Services addresses on which the TNS listener listens
- The gateway that the TNS listener starts in response to incoming connection requests

#### Example of Address to Listen On in listener.ora File

The Oracle database server accesses the gateway using Oracle Net Services and the TCP/IP protocol adapter. The following is the syntax of the connect descriptor entry in the `listener.ora` file:

```

LISTENER=
  (ADDRESS=
    (PROTOCOL=TCP)
    (HOST=host_name)
    (PORT=port_number) )

```

Where *host\_name* is the name of the machine on which the gateway is installed and *port\_number* specifies the port number used by the TNS listener. If you have other listeners running on *host\_name*, the value of *port\_number* must be different from the other listeners' port numbers.

### Example of Gateway to Start in listener.ora File

To direct the TNS listener to start the gateway in response to incoming connection requests, add an entry to the `listener.ora` file with the following syntax:

```

SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
      (PROGRAM=tg4sybs)
      (ENVS=SHLIB_PATH=sybase/sybase_ocs/lib:oracle_home_directory/lib32)
    )
  )

```

Where:

**Table 2–1 Parameter Meanings for listener.ora**

Variable	Description
<i>gateway_sid</i>	specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the <code>tnsnames.ora</code> file.
<i>oracle_home_directory</i>	specifies the Oracle home directory where the gateway resides.
<i>tg4sybs</i>	specifies the Oracle Transparent Gateway for Sybase.
<i>sybase</i>	specifies the directory referred to in the \$SYBASE environment variable (the home of the Sybase software installation).
<i>sybase_ocs</i>	specifies the directory referred to in the \$SYBASE_OCS environment variable (the directory under the home of the Sybase software installation, where the Open Client/Server software, OCS, is installed).

If you are already running a TNS listener that listens on multiple database SIDs, add only the following syntax to `SID_LIST` in the existing `listener.ora` file:

```

SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=.
      .
    )
    (SID_DESC=.
      .
    )
    (SID_DESC=
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
    )
  )

```

```

        (PROGRAM=tg4sybs)
        (ENVS=SHLIB_PATH=sybase/sybase_ocs/lib:oracle_home_directory/lib32)
    )
)

```

**See Also:** *Oracle Net Services Administrator's Guide* for information about changing the `listener.ora` file.

## Task 2: Stop and Start the TNS Listener for the Gateway

The TNS listener must be started to initiate the new settings, as follows:

1. Set the `PATH` environment variable to access the commands in the directory `$ORACLE_HOME/bin` where the gateway is installed. If you have the Bourne or Korn Shell, enter the following:

```

$ PATH=$ORACLE_HOME/bin:$PATH;export PATH
$ SHLIB_PATH=$ORACLE_HOME/lib:$SHLIB_PATH; export SHLIB_PATH

```

If you have the C Shell, enter the following:

```

$ setenv PATH $ORACLE_HOME/bin:$PATH
$ setenv SHLIB_PATH $ORACLE_HOME/lib:$SHLIB_PATH

```

2. If the listener is already running, use the `lsnrctl` command to stop the listener and then start it with the new settings, as follows:

```

$ lsnrctl stop
$ lsnrctl start

```

3. Check the status of the listener with the new settings, as follows:

```

$ lsnrctl status

```

The following is an example of output from a `lsnrctl` status check:

```

LSNRCTL for HPUX: Version 10.2.0.1 - Production on 01-JUN-2005 09:28:13

Copyright (c) 1991, 2004, Oracle. All rights reserved.

Connecting to (ADDRESS=(PROTOCOL=TCP) (HOST=204.179.99.15) (PORT=1551))
STATUS of the LISTENER
-----
Alias                     listener
Version                   TNSLSNR for HPUX: Version 10.2.0.1 - Production
Start Date                28-APRIL-2005 15:38:56
Uptime                    33 days 17 hr. 49 min. 22 sec
Trace Level               off
Security                  OFF
SNMP                      OFF
Listener Parameter File   /users/oracle/gateway/network/admin/listener.ora
Listener Log File        /users/oracle/gateway/network/log/listener.log
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP) (HOST=204.179.99.15) (PORT=1551)))
Services Summary...
Service "tg4sybs" has 1 instance(s).
  Instance "tg4sybs", status UNKNOWN, has 1 handler(s) for this service...
The command completed successfully

```

In this example, `tg4sybs` is the default SID value assigned during installation. You can use any valid ID for the SID, or keep the default.

---



---

**Note:** You must use the same SID value in the `tnsnames.ora` file, and the `listener.ora` file.

---



---

## Configuring the Oracle Database Server for Gateway Access

Before you use the gateway to access Sybase data you must configure the Oracle database server to enable communication with the gateway over Oracle Net Services.

### Configuring Oracle Net Services for the Oracle Database Server

To configure the server you add connect descriptors to the `tnsnames.ora` file. You cannot use the Oracle Net Services Assistant or the Oracle Net Services Easy Config tools to configure the `tnsnames.ora` file. You must edit the file manually.

**See Also:** *Oracle Database Administrator's Guide* for information about editing the `tnsnames.ora` file.

For the Oracle database server to access the gateway, it needs a service name entry or a connect descriptor name entry in the `tnsnames.ora` file to tell the Oracle database server where to make connections. By default, this file is in `$ORACLE_HOME/network/admin`, where `$ORACLE_HOME` is the directory in which the Oracle database server is installed. The `tnsnames.ora` file is required by the Oracle database server accessing the gateway, but not by the gateway.

#### Configuring `tnsnames.ora`

Edit the `tnsnames.ora` file to add a connect descriptor for the gateway. The following is an example of the Oracle Net Services entries using TCP/IP protocol needed for the Oracle database server to access the gateway:

```
connect_descriptor=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=host_name)
      (PORT=port_number)
    )
    (CONNECT_DATA=
      (SID=gateway_sid)
    )
    (HS=OK)
  )
```

Where:

**Table 2–2** *Parameter Meanings for `tnsnames.ora`*

Variable	Description
<code>connect_descriptor</code>	is the description of the object to connect to as specified when creating the database link, such as <code>tg4sybs</code> . Check the <code>sqlnet.ora</code> file for the following parameter setting: <ul style="list-style-type: none"> <li>names.directory_path = (TNSNAMES)</li> </ul> <b>Note:</b> The <code>sqlnet.ora</code> file is typically stored in <code>\$ORACLE_HOME/network/admin</code> .
TCP	is the TCP protocol used for TCP/IP connections.
<code>host_name</code>	specifies the machine where the gateway is running.

**Table 2–2 (Cont.) Parameter Meanings for tnsname.ora**

Variable	Description
<i>port_number</i>	matches the port number used by the Oracle Net Services TNS listener that is listening for the gateway. The TNS listener's port number can be found in the <code>listener.ora</code> file used by the TNS listener. See <a href="#">"Example of Address to Listen On in listener.ora File"</a> on page 2-2.
<i>gateway_sid</i>	specifies the SID of the gateway and matches the SID specified in the <code>listener.ora</code> file of the TNS listener that is listening for the gateway. See <a href="#">"Task 1: Configure Oracle Net Services TNS Listener for the Gateway"</a> on page 2-2 for more information.
(HS=OK)	specifies that this connect descriptor uses the Oracle Heterogeneous Services option.

## Creating Database Links

Any Oracle client connected to the Oracle database server can access Sybase data through the gateway. The Oracle client and the Oracle database server can reside on different machines. The gateway accepts connections only from the Oracle database server.

A connection to the gateway is established through a database link when it is first used in an Oracle session. In this context, a connection refers to the connection between the Oracle database server and the gateway. The connection remains established until the Oracle session ends. Another session or user can access the same database link and get a distinct connection to the gateway and Sybase database.

Database links are active for the duration of a gateway session. If you want to close a database link during a session, you can do so with the ALTER SESSION statement. The database and application administrators of a distributed database system are responsible for managing the necessary database links that define paths to the Sybase database.

**See Also:** *Oracle Database Administrator's Guide* and *Oracle Database Heterogeneous Connectivity Administrator's Guide* for more information about using database links.

## Gateway Password Encryption Tool

The gateway uses userids and passwords to access the information in the remote database. Some userids and passwords must be defined in the Gateway Initialization File to handle functions such as resource recovery. In the current security conscious environment, having plain-text passwords that are accessible in the Initialization File is deemed insecure. The `tg4pwd` encryption utility has been added as part of Heterogeneous Services' generic connectivity to help make this more secure. This utility is accessible by this gateway. The initialization parameters which contain sensitive values can be stored in an encrypted form.

**See Also:** *Oracle Database Heterogeneous Connectivity Administrator's Guide* for more information about using this utility.

## Configuring the Gateway for Multiple Sybase Databases

The tasks for configuring the gateway to access multiple Sybase databases are similar to the tasks for configuring the gateway for a single database. The configuration example assumes the following:

- The gateway is installed and configured with the default SID of tg4sybs
- The ORACLE\_HOME environment variable is set to the directory where the gateway is installed
- The gateway is configured for one Sybase database named db1
- Two Sybase databases named db2 and db3 on a server named syb120\_hpux are being added

Configuring the gateway for additional Sybase databases is similar to configuring it for one database, and involves the following:

- Configuring the gateway
- Configuring the Sybase environment
- Configuring Oracle Net Services for the gateway and the Oracle database server

### Multiple Databases Example: Configuring the Gateway

#### Choose Two System IDs for Each Sybase Database

A separate instance of the gateway accesses the different Sybase databases. Each instance needs its own gateway System ID (SID). For this example, the gateway SIDs are chosen for the instances that access the Sybase databases:

- tg4sybs2 for the gateway accessing database db2
- tg4sybs3 for the gateway accessing database db3

#### Create Two Initialization Parameter Files

Create an initialization parameter file for each instance of the gateway by copying the original initialization parameter file, `$ORACLE_HOME/tg4sybs/admin/inittg4sybs.ora`, twice, naming one with the gateway SID for db2 and the other with the gateway SID for db3:

```
$ cd $ORACLE_HOME/tg4sybs/admin
$ cp inittg4sybs.ora inittg4sybs2.ora
$ cp inittg4sybs.ora inittg4sybs3.ora
```

Change the value of the HS\_FDS\_CONNECT\_INFO parameter in the new files.

For `inittg4sybs2.ora`, enter the following:

```
HS_FDS_CONNECT_INFO=syb120_hpux.db2
```

For `inittg4sybs3.ora`, enter the following:

```
HS_FDS_CONNECT_INFO=syb120_hpux.db3
```

---

**Note:** If you have multiple gateway SIDs for the same Sybase database because you want to use different gateway parameter settings at different times, follow the same procedure. You create several initialization parameter files, each with different SIDs and different parameter settings.

---

## Multiple Databases Example: Configuring the Sybase Environment

Set the Sybase environment variables in both of the new initialization parameter files, as follows:

For `inittg4sybs2.ora`, enter the following:

```
Set SYBASE=sybase
```

For `inittg4sybs3.ora`, enter the following:

```
Set SYBASE=sybase
```

*sybase* is the directory referred to in the \$SYBASE environment variable (the home of the Sybase software installation).

## Multiple Databases Example: Configuring Oracle Net Services Listener

### Add Entries to listener.ora

Add two new entries to the TNS listener configuration file, `listener.ora`. You must have an entry for each gateway instance, even when multiple gateway instances access the same database.

The following example shows the entry for the original installed gateway first, followed by the new entries:

```
SID_LIST_LISTENER=  
(SID_LIST=  
  (SID_DESC=  
    (SID_NAME=tg4sybs)  
    (ORACLE_HOME=oracle_home_directory)  
    (PROGRAM=tg4sybs)  
    (ENVS=SHLIB_PATH=sybase/sybase_ocs/lib:oracle_home_directory/lib32)  
  )  
  (SID_DESC=  
    (SID_NAME=tg4sybs2)  
    (ORACLE_HOME=oracle_home_directory)  
    (PROGRAM=tg4sybs)  
    (ENVS=SHLIB_PATH=sybase/sybase_ocs/lib:oracle_home_directory/lib32)  
  )  
  (SID_DESC=  
    (SID_NAME=tg4sybs3)  
    (ORACLE_HOME=oracle_home_directory)  
    (PROGRAM=tg4sybs)  
    (ENVS=SHLIB_PATH=sybase/sybase_ocs/lib:oracle_home_directory/lib32)  
  )  
)  
)
```

## Multiple Databases Example: Stopping and Starting the TNS Listener

If the listener is already running, use the `lsnrctl` command to stop the listener and then start it with the new settings, as follows:

```
$ lsnrctl stop  
$ lsnrctl start
```

## Multiple Databases Example: Configuring for Gateway Access

## Configuring Oracle Net Services for Multiple Gateway Instances

Add two connect descriptor entries to the `tnsnames.ora` file. You must have an entry for each gateway instance, even if the gateway instances access the same database.

The following Sybase example shows the entry for the original installed gateway first, followed by the two entries for the new gateway instances:

```
old_db_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=1541)
    (HOST=gtwhost))
  (CONNECT_DATA=
    (SID=tg4sybs))
  (HS=OK))
new_db2_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=1541)
    (HOST=gtwhost))
  (CONNECT_DATA=
    (SID=tg4sybs2))
  (HS=OK))
new_db3_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=1541)
    (HOST=gtwhost))
  (CONNECT_DATA=
    (SID=tg4sybs3))
  (HS=OK))
```

The value for `PORT` is the TCP/IP port number of the TNS listener that is listening for the gateway. The number can be found in the `listener.ora` file used by the TNS listener. The value for `HOST` is the name of the machine on which the gateway is running. The name also can be found in the `listener.ora` file used by the TNS listener.

## Multiple Databases Example: Accessing Sybase Data

Enter the following to create a database link for the `tg4sybs2` gateway:

```
SQL> CREATE PUBLIC DATABASE LINK SYBS2 CONNECT TO
  2 user2 IDENTIFIED BY password2 USING 'new_db2_using';
```

Enter the following to create a database link for the `tg4sybs3` gateway:

```
SQL> CREATE PUBLIC DATABASE LINK SYBS3 CONNECT TO
  2 user3 IDENTIFIED BY password3 USING 'new_db3_using';
```

---

**Note:** To encrypt the initialization parameters that would normally be stored in the initialization file in plain text, you must use the `tg4pwd` utility, as described in *Oracle Database Heterogeneous Connectivity Administrator's Guide*.

---

After the database links are established you can query the new Sybase databases, as in the following:

```
SQL> SELECT * FROM ALL_USERS@SYBS2;
```

Or

```
SQL> SELECT * FROM ALL_USERS@SYBS3;
```

## Performing Configuration Tasks

You can perform the following configuration tasks:

- [Configuring for Two-Phase Commit](#)
- [Specifying an Owner](#)

### Configuring for Two-Phase Commit

The gateway supports the following transaction capabilities:

- COMMIT\_CONFIRM
- READ\_ONLY
- SINGLE\_SITE

By default, the gateway runs in COMMIT\_CONFIRM transaction mode. When the Sybase database is updated by a transaction, the gateway becomes the commit point site. The Oracle database server commits the unit of work in the Sybase database after verifying that all Oracle databases in the transaction have successfully prepared the transaction. Only one gateway can participate in an Oracle two-phase commit transaction as the commit point site.

**See Also:** Oracle Database Heterogeneous Connectivity Administrator's Guide for information about the two-phase commit process.

To enable the COMMIT\_CONFIRM transaction mode, create a recovery account and password and create a log table. The log table, called **HS\_TRANSACTION\_LOG**, is where two-phase commit transactions are recorded.

#### Task 1: Create a Recovery Account and Password

For the gateway to recover distributed transactions, a recovery account and password must be set up in the Sybase database. By default, both the user name of the account and the password are RECOVER. The name of the account can be changed with the gateway initialization parameter HS\_FDS\_RECOVERY\_ACCOUNT. The account password can be changed with the gateway initialization parameter HS\_FDS\_RECOVERY\_PWD.

---



---

**Note:** Oracle Corporation recommends that you do not use the default value RECOVER for the user name and password. Moreover, storing plain-text as user name and password in the initialization file is not a good security policy. There is now a utility called `tg4pwd`, that should be used for encryption. Refer to Chapter 4, 'Encrypting Initialization parameters' in the Heterogeneous Connectivity Administration Guide for further details.

---



---

1. Set up a user account in the Sybase database. Both the user name and password must be a valid Sybase user name and password.
2. In the initialization parameter file, set the following gateway initialization parameters:
  - `HS_FDS_RECOVERY_ACCOUNT` to the user name of the Sybase user account you set up for recovery.
  - `HS_FDS_RECOVERY_PWD` to the password of the Sybase user account you set up for recovery.

**See Also:** "[Task 2: Customize the Initialization Parameter File](#)" on page 2-1 for information about editing the initialization parameter file. For information about `HS_FDS_RECOVERY_ACCOUNT` and `HS_FDS_RECOVERY_PWD`, see [Appendix D, "Heterogeneous Services Initialization Parameters"](#).

## Task 2: Create the Transaction Log Table

When configuring the gateway for two-phase commit, a table must be created in the Sybase database for logging transactions. The gateway uses the transaction log table to check the status of failed transactions that were started at the Sybase database by the gateway and registered in the table.

---



---

**Note:** Updates to the transaction log table cannot be part of an Oracle distributed transaction.

---



---



---



---

**Note:** The information in the transaction log table is required by the recovery process and must not be altered. The table must be used, accessed, or updated only by the gateway.

---



---

The table, called `HS_TRANSACTION_LOG`, consists of two columns, `GLOBAL_TRAN_ID`, data type `CHAR(64) NOT NULL` and `TRAN_COMMENT`, data type `CHAR(255)`.

You can use another name for the log table, other than `HS_TRANSACTION_LOG`, by specifying the other name using the `HS_FDS_TRANSACTION_LOG` initialization parameter.

**See Also:** [Appendix D, "Heterogeneous Services Initialization Parameters"](#) for information about the `HS_FDS_TRANSACTION_LOG` initialization parameter.

Create the transaction log table in the user account you created in "[Task 1: Create a Recovery Account and Password](#)" on page 2-10. Because the transaction log table is used to record the status of a gateway transaction, the table must reside at the database where the Sybase update takes place. Also, the transaction log table must be created under the owner of the recovery account.

---

---

**Note:** To utilize the transaction log table, users of the gateway must be granted privileges on the table.

---

---

To create a transaction log table use the `tg4sybs_tx.sql` script, located in the directory `$ORACLE_HOME/tg4sybs/admin` where `$ORACLE_HOME` is the directory under which the gateway is installed. Use `isql` to execute the script, as follows:

```
$ isql -Urecovery_account -Precovery_account_password [-Sserver] -itg4sybs_tx.sql
```

## Specifying an Owner

Instead of using the default owner name for the Sybase tables as defined in Sybase, or explicitly specifying a different owner in the SQL statements, you can specify a default owner that is used whenever a name is not explicitly specified in the SQL statements.

To specify the owner, set the gateway initialization parameter `HS_FDS_DEFAULT_OWNER` in the initialization parameter file.

**See Also:** [Appendix D, "Heterogeneous Services Initialization Parameters"](#) for information about the `HS_FDS_DEFAULT_OWNER` initialization parameter.

---

---

## Sybase Gateway Features and Restrictions

After the gateway is installed and configured, you can use the gateway to access Sybase data, pass Sybase commands from applications to the Sybase database, perform distributed queries, and copy data.

This chapter contains the following sections:

- [Using the Pass-Through Feature](#)
- [Executing Stored Procedures and Functions](#)
- [Database Compatibility Issues for Sybase](#)
- [Known Restrictions](#)
- [Known Problems](#)

### Using the Pass-Through Feature

The gateway can pass Sybase commands or statements from the application to the Sybase database using the DBMS\_HS\_PASSTHROUGH package.

Use the DBMS\_HS\_PASSTHROUGH package in a PL/SQL block to specify the statement to be passed to the Sybase database, as follows:

```
DECLARE
    num_rows INTEGER;
BEGIN
    num_rows := DBMS_HS_PASSTHROUGH.EXECUTE_IMMEDIATE@SYBS('command');
END;
/
```

Where *command* cannot be one of the following:

- BEGIN TRANSACTION
- COMMIT
- ROLLBACK
- SAVE
- SHUTDOWN
- Sybase tool commands

The DBMS\_HS\_PASSTHROUGH package supports passing bind values and executing SELECT statements.

---



---

**Note:** TRUNCATE cannot be used in a pass-through statement.

---



---

**See Also:** *Oracle Database PL/SQL Packages and Types Reference* and Chapter 3 of *Oracle Heterogeneous Connectivity Administrator's Guide* for more information about the DBMS\_HS\_PASSTHROUGH package.

## Executing Stored Procedures and Functions

Using the procedural feature, the gateway can execute stored procedures that are defined in the Sybase database. It is not necessary to relink the gateway or define the procedure to the gateway, but the procedure's access privileges must permit access by the gateway.

**See Also:** *Oracle Database Heterogeneous Connectivity Administrator's Guide* for more information about executing stored procedures.

Standard PL/SQL statements are used to execute a stored procedure.

## Return Values and Stored Procedures

By default, all stored procedures and functions do not return a return value to the user. To enable return values, set the HS\_FDS\_PROC\_IS\_FUNC parameter in the initialization parameter file.

**See Also:** [Appendix D, "Heterogeneous Services Initialization Parameters"](#) for information about both editing the initialization parameter file and the HS\_FDS\_PROC\_IS\_FUNC parameter.

---



---

**Note:** If you set the HS\_FDS\_PROC\_IS\_FUNC gateway initialization parameter, you must change the syntax of the procedure execute statement for all existing stored procedures.

---



---

In the following example, the employee name JOHN SMYTHE is passed to the Sybase stored procedure REVISE\_SALARY. The stored procedure retrieves the salary value from the Sybase database to calculate a new yearly salary for JOHN SMYTHE. The revised salary returned in RESULT is used to update EMP in a table of an Oracle database:

```

DECLARE
  INPUT VARCHAR2(15);
  RESULT NUMBER(8,2);
BEGIN
  INPUT := 'JOHN SMYTHE';
  RESULT := REVISE_SALARY@SYBS(INPUT);
  UPDATE EMP SET SAL = RESULT WHERE ENAME =: INPUT;
END;
/
    
```

The procedural feature automatically converts non-Oracle data types to and from PL/SQL data types.

## Result Sets and Stored Procedures

The Oracle Transparent Gateway for Sybase provides support for stored procedures which return result sets.

By default, all stored procedures and functions do not return a result set to the user. To enable result sets, set the HS\_FDS\_RESULTSET\_SUPPORT parameter in the initialization parameter file.

**See Also:** [Appendix D, "Heterogeneous Services Initialization Parameters"](#) for information about both editing the initialization parameter file and the HS\_FDS\_RESULTSET\_SUPPORT parameter. For further information about Oracle support for result sets in non-Oracle databases see *Oracle Database Heterogeneous Connectivity Administrator's Guide*.

---

**Note:** If you set the HS\_FDS\_RESULTSET\_SUPPORT gateway initialization parameter, you must change the syntax of the procedure execute statement for all existing stored procedures or errors will occur.

---

When accessing stored procedures with result sets through the Oracle Transparent Gateway for Sybase, you must work in the sequential mode of Heterogeneous Services.

The Oracle Transparent Gateway for Sybase returns the following information to Heterogeneous Services during procedure description:

- All the input arguments of the remote stored procedure
- None of the output arguments
- One out argument of type ref cursor (corresponding to the first result set returned by the stored procedure)

Client programs have to use the virtual package function `dbms_hs_result_set.get_next_result_set` to get the ref cursor for subsequent result sets. The last result set returned is the out argument from the procedure.

The limitations of accessing result sets are the following:

- Result sets returned by a remote stored procedure have to be retrieved in the order in which they were placed on the wire
- On execution of a stored procedure, all result sets returned by a previously executed stored procedure will be closed (regardless of whether the data has been completely

In the following example, the Sybase stored procedure is executed to fetch the contents of the emp and dept tables from Sybase:

```
create procedure REFCURPROC (@arg1 varchar(255), @arg2 varchar(255) output)
as
select @arg2 = @arg1
select * from EMP
select * from DEPT
go
```

This stored procedure assigns the input parameter `arg1` to the output parameter `arg2`, opens the query `SELECT * FROM EMP` in ref cursor `rc1`, and opens the query `SELECT * FROM DEPT` in ref cursor `rc2`.

---

**Note:** Chained mode must be set before creating the stored procedure. Issue the following command in Sybase: `set chained on`

---

### OCI Program Fetching from Result Sets in Sequential Mode

The following example shows OCI program fetching from result sets in sequential mode:

```

OCIEnv *ENVH;
OCISvcCtx *SVCH;
OCIStmt *STMH;
OCIError *ERRH;
OCIBind *BNDH[3];
OraText arg1[20];
OraText arg2[255];
OCIResult *rset;
OCIStmt *rstmt;
ub2 rcode[3];
ub2 rlens[3];
sb2 inds[3];
OraText *stmt = (OraText *) "begin refcurproc@SYBS(:1,:2,:3); end;";
OraText *n_rs_stm = (OraText *)
    "begin :ret := DBMS_HS_RESULT_SET.GET_NEXT_RESULT_SET@SYBS; end;";

/* Prepare procedure call statement */

/* Handle Initialization code skipped */
OCIStmtPrepare(STMH, ERRH, stmt, strlen(stmt), OCI_NTV_SYNTAX, OCI_DEFAULT);

/* Bind procedure arguments */
inds[0] = 0;
strcpy((char *) arg1, "Hello World");
rlens[0] = strlen(arg1);
OCIBindByPos(STMH, &BNDH[0], ERRH, 1, (dvoid *) arg1, 20, SQLT_CHR,
             (dvoid *) &(inds[0]), &(rlens[0]), &(rcode[0]), 0, (ub4 *) 0,
             OCI_DEFAULT);
inds[1] = -1;
OCIBindByPos(STMH, &BNDH[1], ERRH, 1, (dvoid *) arg2, 20, SQLT_CHR,
             (dvoid *) &(inds[1]), &(rlens[1]), &(rcode[1]), 0, (ub4 *) 0,
             OCI_DEFAULT);

inds[2] = 0;
rlens[2] = 0;
OCIDescriptorAlloc(ENVH, (dvoid **) &rset, OCI_DTYPE_RSET, 0, (dvoid **) 0);
OCIBindByPos(STMH, &BNDH[2], ERRH, 2, (dvoid *) rset, 0, SQLT_RSET,
             (dvoid *) &(inds[2]), &(rlens[2]), &(rcode[2]),
             0, (ub4 *) 0, OCI_DEFAULT);

/* Execute procedure */
OCIStmtExecute(SVCH, STMH, ERRH, 1, 0, (CONST OCISnapshot *) 0,
              (OCISnapshot *) 0, OCI_DEFAULT);

/* Convert result set to statement handle */
OCIResultSetToStmt(rset, ERRH);

```

```

rstmt = (OCIStmt *) rset;

/* After this the user can fetch from rstmt */
/* Issue get_next_result_set call to get handle to next_result set */
/* Prepare Get next result set procedure call */

OCIStmtPrepare(STMH, ERRH, n_rs_stm, strlen(n_rs_stm), OCI_NTV_SYNTAX,
               OCI_DEFAULT);

/* Bind return value */
OCIBindByPos(STMH, &BNDH[1], ERRH, 1, (dvoid *) rset, 0, SOLT_RSET,
             (dvoid *) &(inds[1]), &(rlens[1]), &(rcode[1]),
             0, (ub4 *) 0, OCI_DEFAULT);

/* Execute statement to get next result set*/
OCIStmtExecute(SVCH, STMH, ERRH, 1, 0, (CONST OCISnapshot *) 0,
              (OCISnapshot *) 0, OCI_DEFAULT);

/* Convert next result set to statement handle */
OCIResultSetToStmt(rset, ERRH);
rstmt = (OCIStmt *) rset;

/* Now rstmt will point to the second result set returned by the
remote stored procedure */

/* Repeat execution of get_next_result_set to get the output arguments */

```

### PL/SQL Program Fetching from Result Sets in Sequential Mode

Assume that the table `loc_emp` is a local table exactly like the Sybase `emp` table. The same assumption applies for `loc_dept`. `outargs` is a table with columns corresponding to the out arguments of the Sybase stored procedure.

```

declare
  rc1 rcpackage.rctype;
  rec1 loc_emp%rowtype;
  rc2 rcpackage.rctype;
  rec2 loc_dept%rowtype;
  rc3 rcpackage.rctype;
  rec3 outargs%rowtype;
  out_arg varchar2(255);

begin

  -- Execute procedure
  out_arg := null;
  refcurproc@SYBS('Hello World', out_arg, rc1);

  -- Fetch 20 rows from the remote emp table and insert them into loc_emp
  for i in 1 .. 20 loop
    fetch rc1 into rec1;
    insert into loc_emp (rec1.empno, rec1.ename, rec1.job,
                       rec1.mgr, rec1.hiredate, rec1.sal, rec1.comm, rec1.deptno);
  end loop;

  -- Close ref cursor
  close rc1;

  -- Get the next result set returned by the stored procedure

```

```
rc2 := dbms_hs_result_set.get_next_result_set@SYBS;

-- Fetch 5 rows from the remote dept table and insert them into loc_dept
for i in 1 .. 5 loop
    fetch rc2 into rec2;
    insert into loc_dept values (rec2.deptno, rec2.dname, rec2.loc);
end loop;

--Close ref cursor
close rc2;

-- Get the output arguments from the remote stored procedure
-- Since we are in sequential mode, they will be returned in the
-- form of a result set
rc3 := dbms_hs_result_set.get_next_result_set@SYBS;

-- Fetch them and insert them into the outarguments table
fetch rc3 into rec3;
insert into outargs (rec3.outarg, rec3.retval);

-- Close ref cursor
close rc3;

end;
/
```

## Database Compatibility Issues for Sybase

Sybase and Oracle databases function differently in some areas, causing compatibility problems. The following compatibility issues are described in this section:

- [Chained Mode](#)
- [Column Definitions](#)
- [Naming Rules](#)
- [Data Types](#)
- [Queries](#)
- [Locking](#)

### Chained Mode

The gateway supports the ANSI-standard chained mode. Sybase stored procedures must be written for this mode. Running in chained mode allows the gateway to extend the Oracle two-phase commit protection to transactions updating Oracle and Sybase databases.

### Column Definitions

By default, a Sybase table column cannot contain null values unless NULL is specified in the column definition. In compliance with the ANSI standard, the Sybase database option "allow nulls by default" can be set to true to change the default column definition to NULL.

For an Oracle table, null values are allowed in a column unless NOT NULL is specified in the column definition.

## Naming Rules

Naming rule issues include the following:

- [Rules for Naming Objects](#)
- [Case Sensitivity](#)

### Rules for Naming Objects

Oracle and Sybase use different database object naming rules. For example, the maximum number of characters allowed for each object name can be different. Also, the use of single and double quotation marks, case sensitivity, and the use of alphanumeric characters can all be different.

**See Also:** *Oracle Database Reference* and Sybase documentation.

### Case Sensitivity

The Oracle database server defaults to uppercase unless you surround identifiers with double quote characters. For example, to refer to the Sybase table called emp, enter the name with double quote characters, as follows:

```
SQL> SELECT * FROM "emp"@SYBS;
```

However, to refer to the Sybase table called emp owned by Scott from an Oracle application, enter the following:

```
SQL> SELECT * FROM "Scott"."emp"@SYBS;
```

If the Sybase table called emp is owned by SCOTT, a table owner name in uppercase letters, you can enter the owner name without double quote characters, as follows:

```
SQL> SELECT * FROM SCOTT."emp"@SYBS;
```

Or

```
SQL> SELECT * FROM scott."emp"@SYBS;
```

Oracle Corporation recommends that you surround all Sybase object names with double quote characters and use the exact letter case for the object names as they appear in the Sybase data dictionary. This convention is not required when referring to the supported Oracle data dictionary tables or views listed in [Appendix C, "Data Dictionary"](#).

If existing applications cannot be changed according to these conventions, create views in Oracle to associate Sybase names to the correct letter case. For example, to refer to the Sybase table emp from an existing Oracle application by using only uppercase names, define the following view:

```
SQL> CREATE VIEW EMP (EMPNO, ENAME, SAL, HIREDATE)
      AS SELECT "empno", "ename", "sal", "hiredate"
      FROM "emp"@SYBS;
```

With this view, the application can issue statements such as the following:

```
SQL> SELECT EMPNO, ENAME FROM EMP;
```

Using views is a workaround solution that duplicates data dictionary information originating in the Sybase data dictionary. You must be prepared to update the Oracle view definitions whenever the data definitions for the corresponding tables are changed in the Sybase database.

## Data Types

Data type issues include the following:

- [Binary Literal Notation](#)
- [Data Type Conversion](#)

### Binary Literal Notation

Oracle SQL uses hexadecimal digits surrounded by single quotes to express literal values being compared or inserted into columns defined as data type RAW.

This notation is not converted to syntax compatible with the Sybase VARBINARY and BINARY data types (a 0x followed by hexadecimal digits, surrounded by single quotes).

For example, the following statement is not supported:

```
SQL> INSERT INTO BINARY_TAB@SYBS VALUES ('0xff')
```

Where BINARY\_TAB contains a column of data type VARBINARY or BINARY. Use bind variables when inserting into or updating VARBINARY and BINARY data types.

### Data Type Conversion

Sybase does not support implicit date conversions. Such conversions must be explicit.

For example, the gateway issues an error for the following SELECT statement:

```
SELECT DATE_COL FROM TEST@  
SYBS  
WHERE DATE_COL = "1-JAN-2001";
```

To avoid problems with implicit conversions, add explicit conversions, as in the following:

```
SELECT DATE_COL FROM TEST@  
SYBS  
WHERE DATE_COL = TO_DATE("1-JAN-2001")
```

**See Also:** [Appendix A, "Data Type Conversion"](#) for more information about restrictions on data types.

## Queries

Query issues include the following:

- [Row Selection](#)
- [Empty Strings](#)
- [Empty Bind Variables](#)

### Row Selection

Sybase evaluates a query condition for all selected rows before returning any of the rows. If there is an error in the evaluation process for one or more rows, no rows are returned even though the remaining rows satisfy the condition.

Oracle evaluates the query condition row-by-row and returns a row when the evaluation is successful. Rows are returned until a row fails the evaluation.

## Empty Strings

Oracle processes an empty string in a SQL statement as a null value. Sybase processes an empty string as an empty string.

Comparing to an empty string

The Gateway passes literal empty strings to the Sybase database without any conversion. If you intended an empty string to represent a null value, Sybase does not process the statement that way; it uses the empty string.

You can avoid this problem by using NULL or IS NULL in the SQL statement instead of the empty string syntax, as in the following example:

```
SELECT * from "emp"@SYBS where "ename" IS NULL;
```

Selecting an empty string

For VARCHAR columns, the gateway returns an empty string to the Oracle database server as NULL value.

For CHAR columns, the gateway returns the full size of the column with each character as empty space (' ').

## Empty Bind Variables

For VARCHAR bind variables, the gateway passes empty bind variables to the Sybase server database as a NULL value.

## Locking

The locking model for an Sybase database differs significantly from the Oracle model. The gateway depends on the underlying Sybase behavior, so Oracle applications that access Sybase through the gateway can be affected by the following possible scenarios:

- Read access might block write access
- Write access might block read access
- Statement-level read consistency is not guaranteed

**See Also:** Sybase documentation for information about the Sybase locking model.

## Known Restrictions

If you encounter incompatibility problems not listed in this section or in "[Known Problems](#)" on page 3-12, please contact Oracle Support Services. The following section describes the known restrictions and includes suggestions for dealing with them when possible:

- [Transactional Integrity](#)
- [Transaction Capability](#)
- [COMMIT or ROLLBACK in PL/SQL Cursor Loops Closes Open Cursors](#)
- [Stored Procedures](#)
- [Pass-Through Feature](#)
- [Sybase NCHAR and NVARCHAR Data Types](#)
- [SQL Syntax](#)
- [SQL\\*Plus COPY Command with Lowercase Table Names](#)

- [Database Links](#)

The following restriction also applies:

- When negative numbers are used as the second parameter in a SUBSTR function, incorrect results are returned. This is due to incompatibility between the Oracle SUBSTR function and the equivalent in Sybase.

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**Note:** If you have any questions or concerns about the restrictions, contact Oracle Support Services.

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## Transactional Integrity

The gateway cannot guarantee transactional integrity in the following cases:

- When a statement that is processed by the gateway causes an implicit commit in the target database
- When the target database is configured to work in autocommit mode

---

---

**Note:** Oracle corporation strongly recommends the following:

- If you know that executing a particular statement causes an implicit commit in the target database, then ensure that this statement is executed in its own transaction.
  - Do not configure the target database to work in autocommit mode.
- 
- 

## Transaction Capability

The gateway does not support savepoints. If a distributed update transaction is under way involving the gateway and a user attempts to create a savepoint, the following error occurs:

```
ORA-02070: database dblink does not support savepoint in this context
```

By default, the gateway is configured as COMMIT\_CONFIRM and it is always the commit point site when the Sybase database is updated by the transaction.

## COMMIT or ROLLBACK in PL/SQL Cursor Loops Closes Open Cursors

Any COMMIT or ROLLBACK issued in a PL/SQL cursor loop closes all open cursors, which can result in the following error:

```
ORA-1002: fetch out of sequence
```

To prevent this error, move the COMMIT or ROLLBACK statement outside the cursor loop.

## Stored Procedures

Changes issued through stored procedures that embed commits or rollbacks cannot be controlled by the Oracle transaction manager or Oracle COMMIT or ROLLBACK commands.

When accessing stored procedures with result sets through the Oracle Transparent Gateway for Sybase, you must work in the sequential mode of Heterogeneous Services.

When accessing stored procedures with multiple result sets through the Oracle Transparent Gateway for Sybase, you must read all the result sets before continuing.

Output parameters of stored procedures must be initialized to a NULL value.

You cannot use RETURN\_VALUE nor RETURNVALUE as the names for any input or output parameters of stored procedures.

## Pass-Through Feature

DDL statements executed by Sybase using the gateway pass-through feature might fail if they are in a multi-statement transaction. Set the Sybase option "ddl in tran" to allow DDL statements in a transaction.

Oracle Corporation recommends that you place a DDL statement in its own transaction when executing such a statement with the pass-through feature. An explicit COMMIT must be issued after the DDL statement.

If the SQL statements being passed through the gateway result in an implicit commit at the Sybase database, the Oracle transaction manager is unaware of the commit and an Oracle ROLLBACK command cannot be used to roll back the transaction.

## Sybase NCHAR and NVARCHAR Data Types

The gateway cannot select a column defined with a Sybase NCHAR or NVARCHAR data type.

## SQL Syntax

This section lists restrictions on the following SQL syntax:

- [WHERE CURRENT OF Clause](#)
- [CONNECT BY Clause](#)
- [ROWID](#)
- [Subqueries in INSERT Statement](#)
- [EXPLAIN PLAN Statement](#)

**See Also:** [Appendix B, "Supported SQL Syntax and Functions"](#) for more information about restrictions on SQL syntax.

### WHERE CURRENT OF Clause

UPDATE and DELETE statements with the WHERE CURRENT OF clause are not supported by the gateway because they rely on the Oracle ROWID implementation. To update or delete a specific row through the gateway, a condition style WHERE clause must be used.

### CONNECT BY Clause

The gateway does not support the CONNECT BY clause in a SELECT statement.

### ROWID

The Oracle ROWID implementation is not supported.

### Subqueries in INSERT Statement

Subqueries of INSERT statements cannot use multiple aliases for the same table. For example, the following statement is not supported:

```
SQL> INSERT INTO "emp_target"@SYBS
      SELECT a."empno" FROM "emp_source"@SYBS a,
      "emp_source"@SYBS b WHERE b."empno"=9999
```

### EXPLAIN PLAN Statement

The EXPLAIN PLAN statement is not supported.

### SQL\*Plus COPY Command with Lowercase Table Names

You need to use double quotes to wrap around lower case table names.

For example:

```
copy from tkhouser/tkhouser@inst1 insert loc_tkhodept using select * from
"tkhodept"@holink2;
```

### Database Links

The gateway is not multithreaded and cannot support shared database links. Each gateway session spawns a separate gateway process and connections cannot be shared.

## Known Problems

This section describes known problems and includes suggestions for correcting them when possible. If you have any questions or concerns about the problems, contact Oracle Support Services. A current list of problems is available online. Contact your local Oracle Corporation office for information about accessing the list.

The following known problems are described in this section:

- [FLOAT Data Type](#)
- [VARBINARY Data Type](#)
- [Encrypted Format Login](#)
- [Date Arithmetic](#)
- [Sybase IMAGE and TEXT Data Type](#)
- [String Functions](#)
- [Schema Names and PL/SQL](#)
- [Data Dictionary Views and PL/SQL](#)
- [Stored Procedures](#)

### FLOAT Data Type

The FLOAT data type precision is (7).

### VARBINARY Data Type

The VARBINARY data type is reported as BINARY.

## Encrypted Format Login

Oracle database server no longer supports the initialization parameter `DBLINK_ENCRYPT_LOGIN`. Up to version 7.3, this parameter's default `TRUE` value prevented the password for the login user ID from being sent over the network (in the clear). Later versions automatically encrypt the password.

## Date Arithmetic

The following SQL expressions do not function correctly with the gateway:

```
date + number
number + date
date - number
date1 - date2
```

Statements with the preceding expressions are sent to the Sybase database without any translation. Since Sybase does not support these date arithmetic functions, the statements return an error.

## Sybase IMAGE and TEXT Data Type

The following restrictions apply when using IMAGE and TEXT data types:

- An unsupported SQL function cannot be used in a SQL statement that accesses a column defined as Sybase data type IMAGE or TEXT.
- You cannot use SQL\*Plus to select data from a column defined as Sybase data type IMAGE or TEXT when the data is greater than 80 characters in length. Oracle Corporation recommends using Pro\*C or Oracle Call Interface to access such data in a Sybase database.
- IMAGE and TEXT data types must be `NULLABLE` for `INSERT` or `UPDATE` to work.
- A table including a IMAGE or TEXT column must have a unique index defined on the table or the table must have a separate column that serves as a primary key.
- IMAGE and TEXT data cannot be read through pass-through queries.

The gateway does not support the PL/SQL function `COLUMN_VALUE_LONG` of the `DBMS_SQL` package.

**See Also:** [Appendix B, "Supported SQL Syntax and Functions"](#) for more information about restrictions on SQL syntax.

## String Functions

If you concatenate numeric literals using the `||` operator when using the gateway to query a Sybase database, the result is an arithmetic addition. For example, the result of the following statement is 18:

```
SQL> SELECT 9 || 9 FROM DUAL@SYBS;
```

The result is 99 when using Oracle to query an Oracle database.

## Schema Names and PL/SQL

If you do not prefix a Sybase database object with its schema name in a SQL statement within a PL/SQL block, the following error message occurs:

ORA-6550 PLS-201 Identifier *table\_name* must be declared.

Change the SQL statement to include the schema name of the object.

## Data Dictionary Views and PL/SQL

You cannot refer to data dictionary views in SQL statements that are inside a PL/SQL block.

## Stored Procedures

Stored procedures with output parameters defined with a CHAR data type return output parameters with VARCHAR data types.

Stored procedures with input or output parameters defined with NUMERIC or DECIMAL data types that are passed with either a NULL value or no value for input will return output values without the fractional part. To prevent this from happening, always specify an input parameter value, even if it is not used.

Return values of stored procedures which return result sets are incorrect.

---

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## Case Studies

The following case studies for Sybase demonstrate some of the features of the Oracle Transparent Gateway. You can verify that the gateway is installed and operating correctly by using the demonstration files included on the distribution CD-ROM.

The demonstration files are automatically copied to disk when the gateway is installed.

This chapter contains the following sections:

- [Case Descriptions](#)
- [CD-ROM Contents](#)
- [Demonstration Files](#)
- [Demonstration Requirements](#)
- [Creating Demonstration Tables](#)
- [Case 1: Simple Queries](#)
- [Case 2: A More Complex Query](#)
- [Case 3: Joining Sybase Tables](#)
- [Case 4: Write Capabilities](#)
- [Case 5: Data Dictionary Query](#)
- [Case 6: The Pass-Through Feature](#)
- [Case 7: Executing Stored Procedures](#)

### Case Descriptions

The cases illustrate:

- A simple query (Case 1)
- A more complex query (Case 2)
- Joining Sybase tables (Case 3)
- Write capabilities (Case 4)
- A data dictionary query (Case 5)
- The pass-through feature (Case 6)
- Executing stored procedures (Case 7)

## CD-ROM Contents

The distribution CD-ROM contains the following:

- Demonstration files
- One SQL script file that creates the demonstration tables and stored procedures in the Sybase database
- One SQL script file that drops the demonstration tables and stored procedures from the Sybase database

## Demonstration Files

After a successful gateway installation, use the demonstration files stored in the directory `$ORACLE_HOME/tg4sybs/demo`, where `$ORACLE_HOME` is the directory under which the gateway is installed. The directory contains the following demonstration files:

Demonstration Files	Demonstration Files
bldsybs.sql	case4c.sql
case1.sql	case5.sql
case2.sql	case6a.sql
case3.sql	case6b.sql
case4a.sql	case7.sql
case4b.sql	dropsybs.sql

## Demonstration Requirements

The case studies assume these requirements have been met:

- The gateway demonstration tables and stored procedures are installed in the Sybase database
- The Oracle server has an account named SCOTT with a password of TIGER
- The Oracle server has a database link called GTWLINK (set up as public or private to the user SCOTT) which connects the gateway to a Sybase database as SCOTT with password TIGER2

For example, you can create the database link as follows:

```
SQL> CREATE DATABASE LINK GTWLINK CONNECT TO SCOTT
      2 IDENTIFIED BY TIGER2 USING 'GTWSID';
```

- Oracle Net Services is configured correctly and running
- The Sybase environment variable, SYBASE, is set correctly

## Creating Demonstration Tables

The case studies are based on the GTW\_EMP, GTW\_DEPT, and GTW\_SALGRADE tables and the stored procedures InsertDept and GetDept. If the demonstration tables and stored procedures have not been created in the Sybase database, use the `bldsybs.sql` script to create them. Enter the following:

```
$ isql -USCOTT -PTIGER2 -ibldsybs.sql
```

The script creates the demonstration tables and stored procedures in the Sybase database accordingly:

```

CREATE TABLE GTW_EMP (
EMPNO      SMALLINT NOT NULL
ENAME      VARCHAR(10),
JOB        VARCHAR(9),
MGR        SMALLINT,
HIREDATE   DATETIME,
SAL        NUMERIC(7,2),
COMM       NUMERIC(7,2),
DEPTNO     SMALLINT)
go

CREATE TABLE GTW_DEPT (
DEPTNO     SMALLINT NOT NULL,
DNAME      VARCHAR(14),
LOC        VARCHAR(13))
go

CREATE TABLE GTW_SALGRADE (
GRADE      MONEY,
LOSAL      NUMERIC(9,4),
HISAL      NUMERIC(9,4))
go

SET CHAINED ON
go

DROP PROCEDURE InsertDept
go

CREATE PROCEDURE InsertDept (@dno INTEGER,
                             @dname VARCHAR(14), @loc VARCHAR(13))
AS INSERT INTO GTW_DEPT VALUES (@dno, @dname, @loc)
go

DROP PROCEDURE GetDept
go

CREATE PROCEDURE GetDept (@dno INTEGER, @dname VARCHAR(14) OUTPUT)
AS SELECT @dname=DNAME FROM GTW_DEPT WHERE DEPTNO=@dno
go

```

## Demonstration Table Definitions

The table definitions are listed here using information retrieved by the SQL\*PLUS DESCRIBE command:

### GTW\_EMP

Name	Null?	Type
EMPNO	NOT NULL	NUMBER(5)
ENAME		VARCHAR2(10)
JOB		VARCHAR2(9)
MGR		NUMBER(5)
HIREDATE		DATE
SAL		NUMBER(7,2)
COMM		NUMBER(7,2)
DEPTNO		NUMBER(5)

**GTW\_DEPT**

Name	Null?	Type
DEPTNO	NOT NULL	NUMBER (5)
DNAME		VARCHAR2 (14)
LOC		VARCHAR2 (13)

**GTW\_SALGRADE**

Name	Null?	Type
GRADE		NUMBER (19, 4)
LOSAL		NUMBER (9, 4)
HISAL		NUMBER (9, 4)

**Demonstration Table Contents**

The contents of the Sybase tables are:

**GTW\_EMP**

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81	2975		20
7654	MARTIN	SALESMAN	7698	28-SEP-81	1250	1400	30
7698	BLAKE	MANAGER	7839	01-MAY-81	2850		30
7782	CLARK	MANAGER	7839	09-JUN-81	2450		10
7788	SCOTT	ANALYST	7566	09-DEC-82	3000		20
7839	KING	PRESIDENT		17-NOV-81	5000		10
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0	30
7876	ADAMS	CLERK	7788	12-JAN-83	1100		20
7900	JAMES	CLERK	7698	03-DEC-81	950		30
7902	FORD	ANALYST	7566	03-DEC-81	3000		20
7934	MILLER	CLERK	7782	23-JAN-82	1300		10

**GTW\_DEPT**

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

**GTW\_SALGRADE**

GRADE	LOSAL	HISAL
1	700	1200
2	1201	1400
3	1401	2000
4	2001	3000
5	3001	9999

## Case 1: Simple Queries

Case 1 demonstrates the following:

- A simple query
- A simple query retrieving full date information

The first query retrieves all the data from GTW\_DEPT and confirms that the gateway is working correctly. The second query retrieves all the data from GTW\_EMP including the time portion of the hire date because the default date format was set to DD-MON-YY HH24:MM:SS for the session by an ALTER SESSION command.

## Case 2: A More Complex Query

Case 2 demonstrates the following:

- The functions SUM(*expression*) and NVL(*expr1*, *expr2*) in the SELECT list
- The GROUP BY and HAVING clauses

This query retrieves the departments from GTW\_EMP whose total monthly expenses are higher than \$10,000.

## Case 3: Joining Sybase Tables

Case 3 demonstrates the following:

- Joins between Sybase tables
- Subselects

The query retrieves information from three Sybase tables and relates the employees to their department name and salary grade, but only for those employees earning more than the average salary.

## Case 4: Write Capabilities

Case 4 is split into three cases and demonstrates the following:

- [DELETE Statement](#)
- [UPDATE Statement](#)
- [INSERT Statement](#)

### DELETE Statement

Case 4a demonstrates bind values and subselect. All employees in department 20 and one employee, WARD, in department 30 are deleted.

### UPDATE Statement

Case 4b provides an example of a simple UPDATE statement. In this example, employees are given a \$100 a month salary increase.

### INSERT Statement

Case 4c is an example of a simple insert statement that does not provide information for all columns.

## Case 5: Data Dictionary Query

Case 5 demonstrates data dictionary mapping. It retrieves all the tables and views that exist in the Sybase database that begin with "GTW".

## Case 6: The Pass-Through Feature

Case 6 demonstrates the gateway pass-through feature which allows an application to send commands or statements to Sybase.

This case demonstrates:

- A pass-through UPDATE statement using bind variables
- A pass-through SELECT statement

### UPDATE Statement

Case 6a provides an example of a pass-through UPDATE statement with bind variables. In this example, the salary for EMPNO 7934 is set to 4000.

### SELECT Statement

Case 6b provides an example of a pass-through SELECT statement. The data that is returned from the SELECT statement is inserted into a local table at the Oracle database server.

## Case 7: Executing Stored Procedures

Case 7 demonstrates the gateway executing a stored procedure in the Sybase database.

Before running the script, make sure that chained mode is set on, by issuing the following command in Sybase:

```
set chained on
```

---



---

## Data Type Conversion

This appendix contains the following section:

- [Data Type Conversion](#)

### Data Type Conversion

The gateway converts Sybase data types to Oracle data types as follows:

**Table A-1 Data Type Conversions**

Sybase	Oracle	Comment
BINARY	RAW	-
BIT	NUMBER(3)	-
CHAR	CHAR	-
DATETIME	DATE	-
DECIMAL	NUMBER(18)	-
DOUBLE PRECISION	FLOAT(49)	-
FLOAT	FLOAT(49)	-
IMAGE	LONG RAW	-
INT	NUMBER(10)	NUMBER range is -2,147,483,647 to 2,147,483,647
MONEY	NUMBER(p,s)	-
NCHAR	Not supported	-
NUMERIC	NUMBER(p,s)	-
NVARCHAR	Not supported	-
REAL	FLOAT(23)	-
SMALLDATETIME	DATE	-
SMALLINT	NUMBER(5)	NUMBER range is -32,767 to 32,767
SMALL MONEY	NUMBER(p,s)	-
TEXT	LONG	-
TINYINT	NUMBER(3)	-
VARBINARY	RAW	-
VARCHAR	VARCHAR2	-



---

---

## Supported SQL Syntax and Functions

This appendix contains the following sections:

- [Supported SQL Statements](#)
- [Oracle Functions](#)

### Supported SQL Statements

With a few exceptions, the gateway provides full support for Oracle DELETE, INSERT, SELECT, and UPDATE statements.

The gateway does not support Oracle data definition language (DDL) statements. No form of the Oracle ALTER, CREATE, DROP, GRANT, or TRUNCATE statements can be used. Instead, for ALTER, CREATE, DROP, and GRANT statements, use the pass-through feature of the gateway if you need to use DDL statements against the Sybase database.

---

---

**Note:** TRUNCATE cannot be used in a pass-through statement.

---

---

**See Also:** *Oracle Database SQL Reference* for detailed descriptions of keywords, parameters, and options and the Sybase documentation for details of executing SQL statements in a transaction.

### DELETE

The DELETE statement is fully supported. However, only Oracle functions supported by Sybase can be used.

**See Also:** "[Functions Supported by Sybase](#)" on page B-2 for a list of supported functions.

### INSERT

The INSERT statement is fully supported. However, only Oracle functions supported by Sybase can be used.

**See Also:** "[Functions Supported by Sybase](#)" on page B-2 for a list of supported functions.

## SELECT

The SELECT statement is fully supported, with these exceptions:

- CONNECT BY *condition*
- NOWAIT
- START WITH *condition*
- WHERE CURRENT OF

## UPDATE

The UPDATE statement is fully supported. However, only Oracle functions supported by Sybase can be used. Also, you cannot have SQL statements in the subquery that refer to the same table name in the outer query. Subqueries are not supported in the SET clause.

**See Also:** ["Functions Supported by Sybase"](#) on page B-2 for a list of supported functions.

## Oracle Functions

All functions are evaluated by the Sybase database after the gateway has converted them to Sybase SQL.

### Functions Not Supported by Sybase

Oracle SQL functions with no equivalent function in Sybase are not supported in DELETE, INSERT, or UPDATE statements, but are evaluated by the Oracle database server if the statement is a SELECT statement. That is, the Oracle database server performs post-processing of SELECT statements sent to the gateway.

If an unsupported function is used in a DELETE, INSERT, or UPDATE, statement, the following Oracle error occurs:

```
ORA-02070: database db_link_name does not support function in this context
```

### Functions Supported by Sybase

The gateway translates the following Oracle database server functions in SQL statements to their equivalent Sybase functions:

- [Arithmetic Operators](#)
- [Comparison Operators](#)
- [Group Functions](#)
- [String Functions](#)
- [Other Functions](#)

#### Arithmetic Operators

Oracle	Sybase
+	+
-	-

Oracle	Sybase
*	*
/	/

### Comparison Operators

Oracle	Sybase
=	=
>	>
<	<
>=	>=
<=	<=
<>, !=, ^=	<>, !=
IS NOT NULL	IS NOT NULL
IS NULL	IS NULL

### Group Functions

Oracle	Sybase
AVG	AVG
COUNT	COUNT
MAX	MAX
MIN	MIN
SUM	SUM

### String Functions

Oracle	Sybase
	+ ( <i>expression1</i> + <i>expression2</i> )
ASCII	ASCII
CHR	CHAR
INSTR	CHARINDEX
LENGTH	CHAR_LENGTH
LOWER	LOWER
SUBSTR (second argument cannot be a negative number)	SUBSTRING
UPPER	UPPER

**Other Functions**

<b>Oracle</b>	<b>Sybase</b>
ABS	ABS
CEIL	CEILING
COS	COS
EXP	EXP
FLOOR	FLOOR
LN	LOG
LOG	LOG10
MOD	%
NOT NVL	IS NOT NULL
NVL	IS NULL
POWER	POWER
ROUND	ROUND
SIN	SIN
SQRT	SQRT
TAN	TAN

---

---

## Data Dictionary

The Oracle Transparent Gateway for Sybase translates a query that refers to an Oracle database server data dictionary table into a query that retrieves the data from Sybase system tables. You perform queries on data dictionary tables over the database link in the same way you query data dictionary tables in the Oracle database server. The gateway data dictionary is similar to the Oracle database server data dictionary in appearance and use.

This appendix contains the following sections:

- [Data Dictionary Support](#)
- [Data Dictionary Mapping](#)
- [Gateway Data Dictionary Descriptions](#)

### Data Dictionary Support

The following paragraphs describe the Oracle Transparent Gateway for Sybase data dictionary support.

#### Sybase System Tables

Sybase data dictionary information is stored in the Sybase database as Sybase system tables. All Sybase system tables have names prefixed with "sys". The Sybase system tables define the structure of a database. When you change data definitions, Sybase reads and modifies the Sybase system tables to add information about the user tables.

#### Accessing the Gateway Data Dictionary

Accessing a gateway data dictionary table or view is identical to accessing a data dictionary in an Oracle database. You issue a SQL SELECT statement specifying a database link. The Oracle database server data dictionary view and column names are used to access the gateway data dictionary in an Oracle database. Synonyms of supported views are also acceptable. For example, the following statement queries the data dictionary table ALL\_CATALOG to retrieve all table names in the Sybase database:

```
SQL> SELECT * FROM "ALL_
CATALOG
"@SYBS;
```

When a data dictionary access query is issued, the gateway:

1. Maps the requested table, view, or synonym to one or more Sybase system table names. The gateway translates all data dictionary column names to their corresponding Sybase column names within the query. If the mapping involves

one Sybase system table, the gateway translates the requested table name to its corresponding Sybase system table name within the query. If the mapping involves multiple Sybase system tables, the gateway constructs a join in the query using the translated Sybase system table names.

2. Sends the translated query to Sybase.
3. Might convert the retrieved Sybase data to give it the appearance of the Oracle database server data dictionary table.
4. Passes the data dictionary information from the translated Sybase system table to the Oracle database server.

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**Note:** The values returned when querying the gateway data dictionary might not be the same as the ones returned by the Oracle SQL\*Plus DESCRIBE command.

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## Direct Queries to Sybase Tables

Queries issued directly to individual Sybase system tables are allowed but they return different results because the Sybase system table column names differ from those of the data dictionary view. Also, certain columns in an Sybase system table cannot be used in data dictionary processing.

## Supported Views and Tables

The gateway supports the following views and tables:

<b>Supported Views and Tables</b>	<b>Supported Views and Tables</b>
ALL_CATALOG	ALL_COL_COMMENTS
ALL_CONS_COLUMNS	ALL_CONSTRAINTS
ALL_IND_COLUMNS	ALL_INDEXES
ALL_OBJECTS	ALL_TAB_COLUMNS
ALL_TAB_COMMENTS	ALL_TABLES
ALL_USERS	ALL_VIEWS
DBA_CATALOG	DBA_COL_COMMENTS
DBA_OBJECTS	DBA_TABLES
DBA_TAB_COLUMNS	DBA_TAB_COMMENTS
DICTIONARY	DICTIONARY
DUAL	TABLE_PRIVILEGES
USER_CATALOG	USER_COL_COMMENTS
USER_CONS_COLUMNS	USER_CONSTRAINTS
USER_IND_COLUMNS	USER_IND_COLUMNS
USER_INDEXES	USER_OBJECTS
USER_TAB_COLUMNS	USER_TAB_COMMENTS
USER_TABLES	USER_USER

No other Oracle database server data dictionary tables or views are supported. If you use a view not on the list, you receive the Oracle database server error code for no more rows available.

Queries through the gateway of any data dictionary table or view beginning with ALL\_ can return rows from the Sybase database even when access privileges for those Sybase objects have not been granted. When querying an Oracle database with the Oracle data dictionary, rows are returned only for those objects you are permitted to access.

## Data Dictionary Mapping

The tables in this section list Oracle data dictionary view names and the equivalent Sybase system tables used. A plus sign (+) indicates that a join operation is involved.

**Table C-1 Oracle Data Dictionary View Names and Sybase Equivalents**

<b>View Name</b>	<b>Sybase System Table Name</b>
ALL_CATALOG	sysusers + sysobjects
ALL_COL_COMMENTS	sysusers + sysobjects + syscolumns
ALL_CONS_COLUMNS	sp_pkeys + sp_fkeys
ALL_CONSTRAINTS	sysconstraints + sysusers + sysobjects
ALL_IND_COLUMNS	sysusers + sysindexes + syscolumns
ALL_INDEXES	sysusers + sysindexes + sysobjects
ALL_OBJECTS	sysusers + sysobjects + sysindexes
ALL_TAB_COLUMNS	sysusers + sysobjects + syscolumns
ALL_TAB_COMMENTS	sysusers + sysobjects
ALL_TABLES	sysusers + sysobjects
ALL_USERS	sysusers
ALL_VIEWS	sysusers + sysobjects + syscomments
DBA_CATALOG	sysusers + sysobjects
DBA_COL_COMMENTS	sysusers + sysobjects + syscolumns
DBA_OBJECTS	sysusers + sysobjects + sysindexes
DBA_TABLES	sysusers + sysobjects
DBA_TAB_COLUMNS	sysusers + sysobjects + syscolumns
DBA_TAB_COMMENTS	sysusers + sysobjects
DICT_COLUMNS	sysobjects + syscolumns
DICTIONARY	sysobjects
DUAL	<i>(Defined in the Gateway)</i>
TABLE_PRIVILEGES	sysprotects + sysusers + sysobjects
USER_CATALOG	sysusers + sysobjects
USER_COL_COMMENTS	sysusers + sysobjects + syscolumns
USER_CONS_COLUMNS	sp_pkeys + sp_fkeys
USER_CONSTRAINTS	sysconstraints + sysusers + sysobjects
USER_IND_COLUMNS	sysusers + sysindexes + syscolumns

**Table C-1 (Cont.) Oracle Data Dictionary View Names and Sybase Equivalents**

View Name	Sybase System Table Name
USER_INDEXES	sysusers + sysindexes + sysobjects
USER_OBJECTS	sysusers + sysobjects + sysindexes
USER_TAB_COLUMNS	sysusers + sysobjects + syscolumns
USER_TAB_COMMENTS	sysusers + sysobjects
USER_TABLES	sysusers + sysobjects
USER_USERS	sysusers
USER_VIEWS	sysusers + sysobjects + syscomments

## Default Column Values

There is a minor difference between the gateway data dictionary and a typical Oracle database server data dictionary. The Oracle database server columns that are missing in an Sybase system table are filled with zeros, spaces, null values, not-applicable values (N.A.), or default values, depending on the column type.

## Gateway Data Dictionary Descriptions

The gateway data dictionary tables and views provide the following information:

- Name, data type, and width of each column
- The contents of columns with fixed values

They are described here with information retrieved by an Oracle SQL\*Plus DESCRIBE command. The values in the Null? column might differ from the Oracle database server data dictionary tables and views. Any default value is shown to the right of an item, but this is not information returned by DESCRIBE.

**Table C-2 ALL\_CATALOG**

Name	Null?	Type	Value
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(5)	"TABLE" or "VIEW"

**Table C-3 ALL\_COL\_COMMENTS**

Name	Null?	Type	Value
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	NOT NULL	VARCHAR2(30)	-
COMMENTS	NOT NULL	CHAR(1)	" "

**Table C-4 ALL\_CONS\_COLUMNS**

Name	Null?	Type	Value
OWNER	NOT NULL	VARCHAR2(30)	-

**Table C-4 (Cont.) ALL\_CONS\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
CONSTRAINT_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(8192)	-
POSITION	-	FLOAT(49)	-

**Table C-5 ALL\_CONSTRAINTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	-	VARCHAR2(30)	-
CONSTRAINT_NAME	-	VARCHAR2(30)	-
CONSTRAINT_TYPE	-	VARCHAR2(1)	"R" or "P"
TABLE_NAME	-	VARCHAR2(30)	-
SEARCH_CONDITION	-	VARCHAR2(1)	NULL
R_OWNER	-	VARCHAR2(30)	-
R_CONSTRAINT_NAME	-	VARCHAR2(30)	-
DELETE_RULE	-	VARCHAR2(9)	"NO ACTION" or ""
STATUS	-	VARCHAR2(7)	"ENABLED"
DEFERRABLE	-	VARCHAR2(1)	NULL
DEFERRED	-	VARCHAR2(1)	NULL
VALIDATED	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
BAD	-	VARCHAR2(1)	NULL
RELY	-	VARCHAR2(1)	NULL
LAST_CHANGE	-	DATE	-

**Table C-6 ALL\_IND\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
INDEX_OWNER	NOT NULL	VARCHAR2(30)	-
INDEX_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(8192)	-
COLUMN_POSITION	NOT NULL	FLOAT(49)	-
COLUMN_LENGTH	NOT NULL	FLOAT(49)	-
DESCEND	-	VARCHAR(4)	"DESC" or "ASC"

**Table C-7 ALL\_INDEXES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
INDEX_NAME	-	VARCHAR2(30)	-
INDEX_TYPE	-	VARCHAR2(1)	NULL
TABLE_OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(7)	"TABLE" or "CLUSTER"
UNIQUENESS	-	VARCHAR2(1)	NULL
COMPRESSION	-	VARCHAR2(1)	NULL
PREFIX_LENGTH	-	NUMBER	0
TABLESPACE_NAME	-	VARCHAR2(1)	NULL
INI_TRANS	-	NUMBER	0
MAX_TRANS	-	NUMBER	0
INITIAL_EXTENT	-	NUMBER	0
NEXT_EXTENT	-	NUMBER	0
MIN_EXTENTS	-	NUMBER	0
MAX_EXTENTS	-	NUMBER	0
PCT_INCREASE	-	NUMBER	0
PCT_THRESHOLD	-	NUMBER	0
INCLUDE_COLUMN	-	NUMBER	0
FREELISTS	-	NUMBER	0
FREELIST_GROUPS	-	NUMBER	0
PCT_FREE	-	NUMBER	0
LOGGING	-	VARCHAR2(1)	NULL
BLEVEL	-	NUMBER	0
LEAF_BLOCKS	-	NUMBER	0
DISTINCT_KEYS	-	NUMBER	0
AVG_LEAF_BLOCKS_PER_KEY	-	NUMBER	0
AVG_DATA_BLOCKS_PER_KEY	-	NUMBER	0
CLUSTERING_FACTOR	-	NUMBER	0
STATUS	-	VARCHAR2(1)	NULL
NUM_ROWS	-	NUMBER	0
SAMPLE_SIZE	-	NUMBER	0
LAST_ANALYZED	-	DATE	NULL
DEGREE	-	VARCHAR2(1)	NULL
INSTANCES	-	VARCHAR2(1)	NULL
PARTITIONED	-	VARCHAR2(1)	NULL

**Table C-7 (Cont.) ALL\_INDEXES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TEMPORARY	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
SECONDARY	-	VARCHAR2(1)	NULL
BUFFER_POOL	-	VARCHAR2(1)	NULL
USER_STATS	-	VARCHAR2(1)	NULL
DURATION	-	VARCHAR2(1)	NULL
PCT_DIRECT_ACCESS	-	NUMBER	0
ITYP_OWNER	-	VARCHAR2(1)	NULL
ITYP_NAME	-	VARCHAR2(1)	NULL
PARAMETERS	-	VARCHAR2(1)	NULL
GLOBAL_STATS	-	VARCHAR2(1)	NULL
DOMIDX_STATUS	-	VARCHAR2(1)	NULL
DOMIDX_OPSTATUS	-	VARCHAR2(1)	NULL
FUNCIDX_STATUS	-	VARCHAR2(1)	NULL

**Table C-8 ALL\_OBJECTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	-	VARCHAR2(30)	-
OBJECT_NAME	-	VARCHAR2(30)	-
SUBOBJECT_NAME	-	VARCHAR2(1)	NULL
OBJECT_ID	-	NUMBER	-
DATA_OBJECT_ID	-	NUMBER	0
OBJECT_TYPE	-	VARCHAR2(9)	"TABLE" or "VIEW" or "PROCEDURE"
CREATED	-	DATE	-
LAST_DDL_TIME	-	DATE	-
TIMESTAMP	-	VARCHAR2(1)	NULL
STATUS	-	VARCHAR2(5)	"VALID"
TEMPORARY	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
SECONDARY	-	VARCHAR2(1)	NULL

**Table C-9 ALL\_TAB\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	-	VARCHAR2(30)	-
TABLE_NAME	-	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(30)	-

**Table C-9 (Cont.) ALL\_TAB\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
DATA_TYPE	-	VARCHAR2(8)	-
DATA_TYPE_MOD	-	VARCHAR2(1)	NULL
DATA_TYPE_OWNER	-	VARCHAR2(1)	NULL
DATA_LENGTH	-	NUMBER	-
DATA_PRECISION	-	NUMBER	-
DATA_SCALE	-	NUMBER	-
NULLABLE	-	VARCHAR2(1)	"Y" or "N"
COLUMN_ID	-	NUMBER	-
DEFAULT_LENGTH	-	NUMBER	0
DATA_DEFAULT	-	VARCHAR2(1)	NULL
NUM_DISTINCT	-	NUMBER	0
LOW_VALUE	-	NUMBER	0
HIGH_VALUE	-	NUMBER	0
DENSITY	-	NUMBER	0
NUM_NULLS	-	NUMBER	0
NUM_BUCKETS	-	NUMBER	0
LAST_ANALYZED	-	DATE	NULL
SAMPLE_SIZE	-	NUMBER	0
CHARACTER_SET_NAME	-	VARCHAR2(1)	NULL
CHAR_COL_DECL_LENGTH	-	NUMBER	0
GLOBAL_STATS	-	VARCHAR2(1)	NULL
USER_STATS	-	VARCHAR2(1)	NULL
AVG_COL_LEN	-	NUMBER	0

**Table C-10 ALL\_TAB\_COMMENTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(5)	"TABLE" or "VIEW"
COMMENTS	-	VARCHAR2(1)	NULL

**Table C-11 ALL\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLESPACE_NAME	NOT NULL	CHAR(1)	" "

**Table C-11 (Cont.) ALL\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
CLUSTER_NAME	NOT NULL	CHAR(1)	" "
IOT_NAME	NOT NULL	CHAR(1)	" "
PCT_FREE	NOT NULL	NUMBER(10)	0
PCT_USED	NOT NULL	NUMBER(10)	0
INI_TRANS	NOT NULL	NUMBER(10)	0
MAX_TRANS	NOT NULL	NUMBER(10)	0
INITIAL_EXTENT	NOT NULL	NUMBER(10)	0
NEXT_EXTENT	NOT NULL	NUMBER(10)	0
MIN_EXTENTS	NOT NULL	NUMBER(10)	0
MAX_EXTENTS	NOT NULL	NUMBER(10)	0
PCT_INCREASE	NOT NULL	NUMBER(10)	0
FREELISTS	NOT NULL	NUMBER(10)	0
FREELIST_GROUPS	NOT NULL	NUMBER(10)	0
LOGGING	NOT NULL	CHAR(1)	" "
BACKED_UP	NOT NULL	CHAR(1)	" "
NUM_ROWS	NOT NULL	NUMBER(10)	0
BLOCKS	NOT NULL	NUMBER(10)	0
EMPTY_BLOCKS	NOT NULL	NUMBER(10)	0
AVG_SPACE	NOT NULL	NUMBER(10)	0
CHAIN_CNT	NOT NULL	NUMBER(10)	0
AVG_ROW_LEN	NOT NULL	NUMBER(10)	0
AVG_SPACE_FREELIST_BLOCKS	NOT NULL	NUMBER(10)	0
NUM_FREELIST_BLOCKS	NOT NULL	NUMBER(10)	0
DEGREE	NOT NULL	CHAR(1)	" "
INSTANCES	NOT NULL	CHAR(1)	" "
CACHE	NOT NULL	CHAR(1)	" "
TABLE_LOCK	NOT NULL	CHAR(1)	" "
SAMPLE_SIZE	NOT NULL	NUMBER(10)	0
LAST_ANALYZED	-	DATE	NULL
PARTITIONED	NOT NULL	CHAR(1)	" "
IOT_TYPE	NOT NULL	CHAR(1)	" "
TEMPORARY	NOT NULL	CHAR(1)	" "
SECONDARY	NOT NULL	CHAR(1)	" "
NESTED	NOT NULL	CHAR(1)	" "
BUFFER_POOL	NOT NULL	CHAR(1)	" "
ROW_MOVEMENT	NOT NULL	CHAR(1)	" "
GLOBAL_STATS	NOT NULL	CHAR(1)	" "

**Table C-11 (Cont.) ALL\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
USER_STATS	NOT NULL	CHAR(1)	" "
DURATION	NOT NULL	CHAR(1)	" "
SKIP_CORRUPT	NOT NULL	CHAR(1)	" "
MONITORING	NOT NULL	CHAR(1)	" "

**Table C-12 ALL\_USERS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
USERNAME	NOT NULL	VARCHAR2(30)	-
USER_ID	NOT NULL	NUMBER(10)	-
CREATED	-	DATE	SYSDATE

**Table C-13 ALL\_VIEWS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	CHAR(30)	-
VIEW_NAME	NOT NULL	CHAR(30)	-
TEXT_LENGTH	NOT NULL	NUMBER(10)	0
TEXT		VARCHAR2(32512)	-
TYPE_TEXT_LENGTH	NOT NULL	NUMBER(10)	0
TYPE_TEXT	NOT NULL	CHAR(1)	" "
OID_TEXT_LENGTH	NOT NULL	NUMBER(10)	0
OID_TEXT	NOT NULL	CHAR(1)	" "
VIEW_TYPE_OWNER	NOT NULL	CHAR(1)	" "
VIEW_TYPE	NOT NULL	CHAR(1)	" "

**Table C-14 DBA\_CATALOG**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(5)	"TABLE" or "VIEW"

**Table C-15 DBA\_COL\_COMMENTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	NOT NULL	VARCHAR2(30)	-
COMMENTS	NOT NULL	CHAR(1)	" "

**Table C-16 DBA\_OBJECTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	-	VARCHAR2(30)	-
OBJECT_NAME	-	VARCHAR2(30)	-
SUBOBJECT_NAME	-	VARCHAR2(1)	NULL
OBJECT_ID	-	NUMBER	-
DATA_OBJECT_ID	-	NUMBER	0
OBJECT_TYPE	-	VARCHAR2(9)	"TABLE" or "VIEW" or "PROCEDURE"
CREATED	-	DATE	-
LAST_DDL_TIME	-	DATE	-
TIMESTAMP	-	VARCHAR2(1)	NULL
STATUS	-	VARCHAR2(5)	NULL
TEMPORARY	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
SECONDARY	-	VARCHAR2(1)	NULL

**Table C-17 DBA\_TAB\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	-	VARCHAR2(30)	-
TABLE_NAME	-	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(30)	-
DATA_TYPE	-	VARCHAR2(8)	-
DATA_TYPE_MOD	-	VARCHAR2(1)	NULL
DATA_TYPE_OWNER	-	VARCHAR2(1)	NULL
DATA_LENGTH	-	NUMBER	-
DATA_PRECISION	-	NUMBER	-
DATA_SCALE	-	NUMBER	-
NULLABLE	-	VARCHAR2(1)	"Y" or "N"
COLUMN_ID	-	NUMBER	-
DEFAULT_LENGTH	-	NUMBER	0
DATA_DEFAULT	-	VARCHAR2(1)	NULL
NUM_DISTINCT	-	NUMBER	0
LOW_VALUE	-	NUMBER	0
HIGH_VALUE	-	NUMBER	0
DENSITY	-	NUMBER	0
NUM_NULLS	-	NUMBER	0
NUM_BUCKETS	-	NUMBER	0
LAST_ANALYZED	-	DATE	NULL

**Table C-17 (Cont.) DBA\_TAB\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
SAMPLE_SIZE	-	NUMBER	0
CHARACTER_SET_NAME	-	VARCHAR2(1)	NULL
CHAR_COL_DEC_LENGTH	-	NUMBER	0
GLOBAL_STATS	-	VARCHAR2(1)	NULL
USER_STATS	-	VARCHAR2(1)	NULL
AVG_COL_LEN	-	NUMBER	0

**Table C-18 DBA\_TAB\_COMMENTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(5)	"TABLE" or "VIEW"
COMMENTS	-	VARCHAR2(1)	NULL

**Table C-19 DBA\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLESPACE_NAME	NOT NULL	CHAR(1)	" "
CLUSTER_NAME	NOT NULL	CHAR(1)	" "
IOT_NAME	NOT NULL	CHAR(1)	" "
PCT_FREE	NOT NULL	NUMBER(10)	0
PCT_USED	NOT NULL	NUMBER(10)	0
INI_TRANS	NOT NULL	NUMBER(10)	0
MAX_TRANS	NOT NULL	NUMBER(10)	0
INITIAL_EXTENT	NOT NULL	NUMBER(10)	0
NEXT_EXTENT	NOT NULL	NUMBER(10)	0
MIN_EXTENTS	NOT NULL	NUMBER(10)	0
MAX_EXTENTS	NOT NULL	NUMBER(10)	0
PCT_INCREASE	NOT NULL	NUMBER(10)	0
FREELISTS	NOT NULL	NUMBER(10)	0
FREELIST_GROUPS	NOT NULL	NUMBER(10)	0
LOGGING	NOT NULL	CHAR(1)	" "
BACKED_UP	NOT NULL	CHAR(1)	" "
NUM_ROWS	NOT NULL	NUMBER(10)	0
BLOCKS	NOT NULL	NUMBER(10)	0

**Table C-19 (Cont.) DBA\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
EMPTY_BLOCKS	NOT NULL	NUMBER(10)	0
AVG_SPACE	NOT NULL	NUMBER(10)	0
CHAIN_CNT	NOT NULL	NUMBER(10)	0
AVG_ROW_LEN	NOT NULL	NUMBER(10)	0
AVG_SPACE_FREELIST_BLOCKS	NOT NULL	NUMBER(10)	0
NUM_FREELIST_BLOCKS	NOT NULL	NUMBER(10)	0
DEGREE	NOT NULL	CHAR(1)	" "
INSTANCES	NOT NULL	CHAR(1)	" "
CACHE	NOT NULL	CHAR(1)	" "
TABLE_LOCK	NOT NULL	CHAR(1)	" "
SAMPLE_SIZE	NOT NULL	NUMBER(10)	0
LAST_ANALYZED	-	DATE	NULL
PARTITIONED	NOT NULL	CHAR(1)	" "
IOT_TYPE	NOT NULL	CHAR(1)	" "
TEMPORARY	NOT NULL	CHAR(1)	" "
SECONDARY	NOT NULL	CHAR(1)	" "
NESTED	NOT NULL	CHAR(1)	" "
BUFFER_POOL	NOT NULL	CHAR(1)	" "
ROW_MOVEMENT	NOT NULL	CHAR(1)	" "
GLOBAL_STATS	NOT NULL	CHAR(1)	" "
USER_STATS	NOT NULL	CHAR(1)	" "
DURATION	NOT NULL	CHAR(1)	" "
SKIP_CORRUPT	NOT NULL	CHAR(1)	" "
MONITORING	NOT NULL	CHAR(1)	" "

**Table C-20 DICT\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	NOT NULL	VARCHAR2(30)	-
COMMENTS	NOT NULL	CHAR(1)	" "

**Table C-21 DICTIONARY**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COMMENTS	NOT NULL	CHAR(1)	" "

**Table C-22 DUAL**

Name	Null?	Type	Value
DUMMY	NOT NULL	VARCHAR2(1)	"X"

**Table C-23 TABLE\_PRIVILEGES**

Name	Null?	Type	Value
GRANTEE	NOT NULL	VARCHAR2(30)	-
OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
GRANTOR	NOT NULL	VARCHAR2(30)	-
SELECT_PRIV	-	VARCHAR2(1)	"Y"
INSERT_PRIV	-	VARCHAR2(1)	"A"
DELETE_PRIV	-	VARCHAR2(1)	"Y"
UPDATE_PRIV	-	VARCHAR2(1)	"A"
REFERENCES_PRIV	-	VARCHAR2(1)	"A"
ALTER_PRIV	-	VARCHAR2(1)	"Y"
INDEX_PRIV	-	VARCHAR2(1)	"Y"
CREATED	NOT NULL	DATE	-

**Table C-24 USER\_CATALOG**

Name	Null?	Type	Value
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(5)	"TABLE" or "VIEW"

**Table C-25 USER\_COL\_COMMENTS**

Name	Null?	Type	Value
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	NOT NULL	VARCHAR2(30)	-
COMMENTS	-	VARCHAR2(1)	NULL

**Table C-26 USER\_CONS\_COLUMNS**

Name	Null?	Type	Value
OWNER	-	VARCHAR2(30)	-
CONSTRAINT_NAME	-	VARCHAR2(30)	-
TABLE_NAME	-	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(4000)	-
POSITION	-	NUMBER	-

**Table C-27 USER\_CONSTRAINTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OWNER	-	VARCHAR2(30)	-
CONSTRAINT_NAME	-	VARCHAR2(30)	-
CONSTRAINT_TYPE	-	VARCHAR2(1)	"R" or "P"
TABLE_NAME	-	VARCHAR2(30)	-
SEARCH_CONDITION	-	VARCHAR2(1)	NULL
R_OWNER	-	VARCHAR2(30)	-
R_CONSTRAINT_NAME	-	VARCHAR2(30)	-
DELETE_RULE	-	VARCHAR2(9)	"NOACTION" or ""
STATUS	-	VARCHAR2(7)	"ENABLED"
DEFERRABLE	-	VARCHAR2(1)	NULL
DEFERRED	-	VARCHAR2(1)	NULL
VALIDATED	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
BAD	-	VARCHAR2(1)	NULL
RELY	-	VARCHAR2(1)	NULL
LAST_CHANGE	-	DATE	-

**Table C-28 USER\_IND\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
INDEX_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(8192)	-
COLUMN_POSITION	NOT NULL	FLOAT(49)	-
COLUMN_LENGTH	NOT NULL	FLOAT(49)	-
DESCEND	-	VARCHAR(4)	"DESC" or "ASC"

**Table C-29 USER\_INDEXES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
INDEX_NAME	-	VARCHAR2(30)	-
INDEX_TYPE	-	VARCHAR2(1)	NULL
TABLE_OWNER	NOT NULL	VARCHAR2(30)	-
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(7)	"TABLE" or "CLUSTER"
UNIQUENESS	-	VARCHAR2(1)	NULL
COMPRESSION	-	VARCHAR2(1)	NULL

**Table C-29 (Cont.) USER\_INDEXES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
PREFIX_LENGTH	-	NUMBER	0
TABLESPACE_NAME	-	VARCHAR2(1)	NULL
INI_TRANS	-	NUMBER	0
MAX_TRANS	-	NUMBER	0
INITIAL_EXTENT	-	NUMBER	0
NEXT_EXTENT	-	NUMBER	0
MIN_EXTENTS	-	NUMBER	0
MAX_EXTENTS	-	NUMBER	0
PCT_INCREASE	-	NUMBER	0
PCT_THRESHOLD	-	NUMBER	0
INCLUDE_COLUMN	-	NUMBER	0
FREELISTS	-	NUMBER	0
FREELIST_GROUPS	-	NUMBER	0
PCT_FREE	-	NUMBER	0
LOGGING	-	VARCHAR2(1)	NULL
BLEVEL	-	NUMBER	0
LEAF_BLOCKS	-	NUMBER	0
DISTINCT_KEYS	-	NUMBER	0
AVG_LEAF_BLOCKS_PER_KEY	-	NUMBER	0
AVG_DATA_BLOCKS_PER_KEY	-	NUMBER	0
CLUSTERING_FACTOR	-	NUMBER	0
STATUS	-	VARCHAR2(1)	NULL
NUM_ROWS	-	NUMBER	0
SAMPLE_SIZE	-	NUMBER	0
LAST_ANALYZED	-	DATE	NULL
DEGREE	-	VARCHAR2(1)	NULL
INSTANCES	-	VARCHAR2(1)	NULL
PARTITIONED	-	VARCHAR2(1)	NULL
TEMPORARY	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
SECONDARY	-	VARCHAR2(1)	NULL
BUFFER_POOL	-	VARCHAR2(1)	NULL
USER_STATS	-	VARCHAR2(1)	NULL
DURATION	-	VARHCAR2(1)	NULL
PCT_DIRECT_ACCESS	-	NUMBER	0
ITYP_OWNER	-	VARCHAR2(1)	NULL
ITYP_NAME	-	VARCHAR2(1)	NULL

**Table C-29 (Cont.) USER\_INDEXES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
PARAMETERS	-	VARCHAR2(1)	NULL
GLOBAL_STATS	-	VARCHAR2(1)	NULL
DOMIDX_STATUS	-	VARCHAR2(1)	NULL
DOMIDX_OPSTATUS	-	VARCHAR2(1)	NULL
FUNCIDX_STATUS	-	VARCHAR2(1)	NULL

**Table C-30 USER\_OBJECTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
OBJECT_NAME	-	VARCHAR2(30)	-
SUBOBJECT_NAME	-	VARCHAR2(1)	NULL
OBJECT_ID	-	NUMBER	-
DATA_OBJECT_ID	-	NUMBER	0
OBJECT_TYPE	-	VARCHAR2(9)	"TABLE" or "VIEW" or "PROCEDURE"
CREATED	-	DATE	-
LAST_DDL_TIME	-	DATE	-
TIMESTAMP	-	VARCHAR2(1)	NULL
STATUS	-	VARCHAR2(5)	"VALID"
TEMPORARY	-	VARCHAR2(1)	NULL
GENERATED	-	VARCHAR2(1)	NULL
SECONDARY	-	VARCHAR2(1)	NULL

**Table C-31 USER\_TAB\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TABLE_NAME	-	VARCHAR2(30)	-
COLUMN_NAME	-	VARCHAR2(30)	-
DATA_TYPE	-	VARCHAR2(8)	-
DATA_TYPE_MOD	-	VARCHAR2(1)	NULL
DATA_TYPE_OWNER	-	VARCHAR2(1)	NULL
DATA_LENGTH	-	NUMBER	-
DATA_PRECISION	-	NUMBER	-
DATA_SCALE	-	NUMBER	-
NULLABLE	-	VARCHAR2(1)	"Y" or "N"
COLUMN_ID	-	NUMBER	-
DEFAULT_LENGTH	-	NUMBER	0
DATA_DEFAULT	-	VARCHAR2(1)	NULL
NUM_DISTINCT	-	NUMBER	0

**Table C-31 (Cont.) USER\_TAB\_COLUMNS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
LOW_VALUE	-	NUMBER	0
HIGH_VALUE	-	NUMBER	0
DENSITY	-	NUMBER	0
NUM_NULLS	-	NUMBER	0
NUM_BUCKETS	-	NUMBER	0
LAST_ANALYZED	-	DATE	NULL
SAMPLE_SIZE	-	NUMBER	0
CHARACTER_SET_NAME	-	VARCHAR2(1)	NULL
CHAR_COL_DECL_LENGTH	-	NUMBER	0
GLOBAL_STATS	-	VARCHAR2(1)	NULL
USER_STATS	-	VARCHAR2(1)	NULL
AVG_COL_LEN	-	NUMBER	0

**Table C-32 USER\_TAB\_COMMENTS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLE_TYPE	-	VARCHAR2(5)	"TABLE" or "VIEW"
COMMENTS	-	VARCHAR2(1)	NULL

**Table C-33 USER\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TABLE_NAME	NOT NULL	VARCHAR2(30)	-
TABLESPACE_NAME	-	VARCHAR2(1)	NULL
CLUSTER_NAME	-	VARCHAR2(1)	NULL
IOT_NAME	-	VARCHAR2(1)	NULL
PCT_FREE	-	NUMBER	0
PCT_USED	-	NUMBER	0
INI_TRANS	-	NUMBER	0
MAX_TRANS	-	NUMBER	0
INITIAL_EXTENT	-	NUMBER	0
NEXT_EXTENT	-	NUMBER	0
MIN_EXTENTS	-	NUMBER	0
MAX_EXTENTS	-	NUMBER	0
PCT_INCREASE	-	NUMBER	0
FREELISTS	-	NUMBER	0
FREELIST_GROUPS	-	NUMBER	0

**Table C-33 (Cont.) USER\_TABLES**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
LOGGING	-	VARCHAR2(1)	NULL
BACKED_UP	-	VARCHAR2(1)	NULL
NUM_ROWS	-	NUMBER	0
BLOCKS	-	NUMBER	0
EMPTY_BLOCKS	-	NUMBER	0
AVG_SPACE	-	NUMBER	0
CHAIN_CNT	-	NUMBER	0
AVG_ROW_LEN	-	NUMBER	0
AVG_SPACE_FREELIST_BLOCKS	-	NUMBER	0
NUM_FREELIST_BLOCKS	-	NUMBER	0
DEGREE	-	VARCHAR2(1)	NULL
INSTANCES	-	VARCHAR2(1)	NULL
CACHE	-	VARCHAR2(1)	NULL
TABLE_LOCK	-	VARCHAR2(1)	NULL
SAMPLE_SIZE	-	NUMBER	0
LAST_ANALYZED	-	DATE	NULL
PARTITIONED	-	VARCHAR2(1)	NULL
IOT_TYPE	-	VARCHAR2(1)	NULL
TEMPORARY	-	VARHCAR2(1)	NULL
SECONDARY	-	VARCHAR2(1)	NULL
NESTED	-	VARCHAR2(1)	NULL
BUFFER_POOL	-	VARCHAR2(1)	NULL
ROW_MOVEMENT	-	VARCHAR2(1)	NULL
GLOBAL_STATS	-	VARCHAR2(1)	NULL
USER_STATS	-	VARCHAR2(1)	NULL
DURATION	-	VARCHAR2(1)	NULL
SKIP_CORRUPT	-	VARCHAR2(1)	NULL
MONITORING	-	VARCHAR2(1)	NULL

**Table C-34 USER\_USERS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
USERNAME	NOT NULL	VARCHAR2(30)	-
USER_ID	NOT NULL	NUMBER(5)	-
ACCOUNT_STATUS	-	VARCHAR2(4)	"OPEN"
LOCK_DATE	-	DATE	NULL
EXPIRY_DATE	-	DATE	NULL
DEFAULT_TABLESPACE	-	VARCHAR2(1)	NULL

**Table C-34 (Cont.) USER\_USERS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
TEMPORARY_TABLESPACE	-	VARCHAR2(1)	NULL
CREATED	-	DATE	SYSDATE
INITIAL_RSRC_CONSUMER_GROUP	-	VARCHAR2(1)	NULL
EXTERNAL_NAME	-	VARCHAR2(1)	NULL

**Table C-35 USER\_VIEWS**

<b>Name</b>	<b>Null?</b>	<b>Type</b>	<b>Value</b>
VIEW_NAME	NOT NULL	VARCHAR2(30)	-
TEXT_LENGTH	-	NUMBER	0
TEXT	-	VARCHAR2(255)	-
TYPE_TEXT_LENGTH	-	NUMBER	0
TYPE_TEXT	-	VARCHAR2(1)	NULL
OID_TEXT_LENGTH	-	NUMBER	0
OID_TEXT	-	VARCHAR2(1)	NULL
VIEW_TYPE_OWNER	-	VARCHAR2(1)	NULL
VIEW_TYPE	-	VARCHAR2(1)	NULL

---

---

## Heterogeneous Services Initialization Parameters

The Oracle database server initialization parameters in the `init.ora` file are distinct from heterogeneous services (HS) initialization parameters. Set HS parameters in the initialization parameter file using an agent-specific mechanism, or set them in the Oracle data dictionary using the `DBMS_HS` package.

This appendix contains information about the following Heterogeneous Services initialization parameters:

- `HS_FDS_CONNECT_INFO`
- `HS_FDS_DEFAULT_OWNER`
- `HS_FDS_PARSER_TOKEN_SIZE`
- `HS_FDS_PROC_IS_FUNC`
- `HS_FDS_RECOVERY_ACCOUNT`
- `HS_FDS_RECOVERY_PWD`
- `HS_FDS_RESULTSET_SUPPORT`
- `HS_FDS_TRACE_LEVEL`
- `HS_FDS_TRANSACTION_LOG`
- `HS_FDS_TRANSACTION_MODEL`

**See Also:** *Oracle Database Heterogeneous Connectivity Administrator's Guide* for information on other available initialization parameters.

The HS initialization parameter file must be available when the gateway is started. During installation, the following default HS initialization parameter file is created:

```
$(ORACLE_HOME)/tg4sybs/admin/inittg4sybs.ora
```

Where `$(ORACLE_HOME)` is the directory under which the gateway is installed.

### HS Initialization Parameter File Syntax

The syntax for the initialization parameter file is as follows:

1. The file is a sequence of commands.
2. Each command should start on a separate line.

3. End of line is considered a command terminator (unless escaped with a backslash).
4. Each command can have one of the following forms:
  - a. `<param> = <value>`
  - b. `set <param> = <value>`
  - c. `private <param> = <value>`
  - d. `set private <param> = <value>`

Where:

`<param>` is an initialization parameter name.

`<value>` is the initialization parameter value.

'set' and 'private' are keywords.

5. The keywords 'set' and 'private' are reserved. You cannot use either as an initialization parameter name. The 'set' keyword indicates that the initialization parameter should be set as an environment variable in the agent. The 'private' keyword indicates that the initialization parameter should be private to the agent and should not be uploaded to the server. Most initialization parameters should not be private. If, however, you are storing something sensitive like a password in the initialization parameter file, then you may not want it uploaded to the server because the initialization parameters and values are not encrypted when uploaded. Making these initialization parameters private prevents the upload from happening.
6. An initialization parameter name is a string of characters starting with a letter and consisting of letters, digits and underscores. Initialization parameter names are case sensitive.
7. An initialization parameter value is either:
  - a. A string of characters that does not contain any backslashes, white space or double quotation marks (")
  - b. A quoted string beginning with a double quotation mark and ending with a double quotation mark. The following can be used inside a quoted string:
    - \* backslash (\) is the escape character
    - \* \n inserts a new line
    - \* \t inserts a tab
    - \* \" inserts a double quotation mark
    - \* \\ inserts a backslash

A backslash at the end of the line continues the string on the next line. If a backslash precedes any other character then the backslash is ignored.

If there is a syntax error in an initialization parameter file, none of the settings take effect.

## HS\_FDS\_CONNECT\_INFO

Default Value	Range of Values
None	Not Applicable

Specifies the information needed to connect to the Sybase database.

This is a required parameter, whose format is:

```
HS_FDS_CONNECT_INFO=server_name.database_name[,INTERFACE=interface_file]
```

Where:

*server\_name* is the name of the server machine for the Sybase data.

*database\_name* is the name of the database.

*interface\_file* is the full path and name of a Sybase interface file.

The entries for both the *server\_name* and *database\_name* are case-sensitive.

## HS\_FDS\_DEFAULT\_OWNER

Default Value	Range of Values
Not Applicable	Any value

The name of the table owner that is used for the Sybase tables if an owner is not specified in the SQL statements.

The name of the table owner is case-sensitive.

---

**Note:** If this parameter is not specified and the owner is not explicitly specified in the SQL statement, then the user name of the Oracle user or the user name specified when creating the database link is used.

---

## HS\_FDS\_PARSER\_TOKEN\_SIZE

Default Value	Range of Values
1,000 Characters	Any positive integer value

Used for setting the parser token size in case the default size is not sufficient. The default value can be changed in cases when the following error occurs:

```
pclex input buffer overflowed, try to increase the variable tokenSize in your environment.
```

With default value of 1000, the gateway could handle SQL statements close to 2M.

Note that the SQL statements sent to the gateway could be very different from the SQL statements issued by the users. If in doubt, turn on gateway trace. Increase this parameter to handle larger SQL statements sent to gateways

## HS\_FDS\_PROC\_IS\_FUNC

Default Value	Range of Values
Not Applicable	Any value

Enables return values from functions. By default, all stored procedures and functions do not return a return value to the user.

---

---

**Note:** If you set this initialization parameter, you must change the syntax of the procedure execute statement for all existing stored procedures to handle return values.

---

---

## HS\_FDS\_RECOVERY\_ACCOUNT

Default Value	Range of Values
RECOVER	Any valid userid

Specifies the name of the recovery account used for the commit-confirm transaction model. An account with user name and password must be set up at Sybase. For more information about the commit-confirm model, see the HS\_FDS\_TRANSACTION\_MODEL parameter.

The name of the recovery account is case-sensitive.

## HS\_FDS\_RECOVERY\_PWD

Default Value	Range of Values
RECOVER	Any valid password

Specifies the password of the recovery account used for the commit-confirm transaction model set up at Sybase. For more information about the commit-confirm model, see the HS\_FDS\_TRANSACTION\_MODEL parameter.

The name of the password of the recovery account is case-sensitive.

## HS\_FDS\_RESULTSET\_SUPPORT

Default Value	Range of Values
none	Any value

Enables result sets to be returned from stored procedures. By default, all stored procedures do not return a result set to the user.

---

---

**Note:** If you set this initialization parameter, you must do the following:

- Change the syntax of the procedure execute statement for all existing stored procedures, to handle result sets
  - Work in the sequential mode of Heterogeneous Services
- 
-

## HS\_FDS\_TRACE\_LEVEL

Default Value	Range of Values
OFF	OFF, ON

Specifies whether error tracing is turned on or off for gateway connectivity.

The following values are valid:

- OFF disables the tracing of error messages.
- ON enables the tracing of error messages that occur when you encounter problems. The results are written to a gateway connectivity log file, in `$ORACLE_HOME/TG4SYBS/LOG`.

## HS\_FDS\_TRANSACTION\_LOG

Default Value	Range of Values
HS_TRANSACTION_LOG	Any valid table name

Specifies the name of the table created in the Sybase database for logging transactions. For more information about the transaction model, see the `HS_FDS_TRANSACTION_MODEL` parameter.

## HS\_FDS\_TRANSACTION\_MODEL

Default Value	Range of Values
COMMIT_CONFIRM	COMMIT_CONFIRM, READ_ONLY, or SINGLE_SITE

Specifies the type of transaction model that is used when the Sybase database is updated by a transaction.

The following values are possible:

- `COMMIT_CONFIRM` provides read and write access to the Sybase database and allows the gateway to be part of a distributed update. To use the commit-confirm model, the following items must be created in the Sybase database:
  - Transaction log table. The default table name is `HS_TRANSACTION_LOG`. A different name can be set using the `HS_FDS_TRANSACTION_LOG` parameter. The transaction log table must be granted `SELECT`, `DELETE`, and `INSERT` privileges set to public.
  - Recovery account. The account name is assigned with the `HS_FDS_RECOVERY_ACCOUNT` parameter.
  - Recovery account password. The password is assigned with the `HS_FDS_RECOVERY_PWD` parameter.
- `READ_ONLY` provides read access to the Sybase database.
- `SINGLE_SITE` provides read and write access to the Sybase database. However, the gateway cannot participate in distributed updates.



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