Oracle® Database Gateway
Installation and Configuration Guide
12c Release 1 (12.1) for IBM AIX on POWER Systems (64-Bit),
Linux x86-64, Oracle Solaris on SPARC (64-Bit), Oracle Solaris
on x86-64 (64-Bit), and HP-UX Itanium
E17927-11

July 2014
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This guide describes how to install and configure Oracle Database Gateway for Sybase, Informix, Teradata, SQL Server, ODBC, and DRDA on UNIX based platforms.

**Intended Audience**

This manual is intended for users responsible for installing and configuring Oracle Database Gateway for Sybase, Informix, Teradata, SQL Server, ODBC, and DRDA on UNIX based platforms.

**Documentation Accessibility**

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

**Access to Oracle Support**

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

**Related Documents**

For more information, see the following documents:

- Oracle Database Gateway for Sybase User’s Guide
- Oracle Database Gateway for Teradata User’s Guide
- Oracle Database Gateway for Informix User’s Guide
- Oracle Database Gateway for SQL Server User’s Guide
- Oracle Database Gateway for ODBC User’s Guide
- Oracle Database Gateway for DRDA User’s Guide
- Oracle Database New Features Guide
- Oracle Database Administrator’s Guide
- Oracle Database Concepts
- Oracle Database Error Messages
- Oracle Database Reference
Conventions

The following typographic conventions are used in this manual:

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<td><strong>bold</strong></td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary</td>
</tr>
<tr>
<td><em>italics</em></td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td>monospace</td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter, directory names, usernames, pathnames, and filenames.</td>
</tr>
<tr>
<td>UPPERCASE</td>
<td>Uppercase letters indicate Structured Query Language (SQL) reserved words, initialization parameters, and environment variables.</td>
</tr>
<tr>
<td>[text]</td>
<td>Brackets are used in syntax statements for optional elements.</td>
</tr>
<tr>
<td>[text</td>
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Part I

Overview of the Oracle Database Gateway Installation

Part I contains the following chapter:

- Chapter 1, "Overview of the Oracle Database Gateway Installation"
Overview of the Oracle Database Gateway Installation

This chapter describes issues that you should consider before installing the Oracle Database Gateways. It includes the following topics:

- Gateway Installation Configurations
- Gateway Installation Methods
- Installation Considerations
- Oracle Database Gateway Upgrades
- Accessing the Installation Software
- Running the Oracle Universal Installer
- Installing and Configuring in Cluster Environments

Gateway Installation Configurations

You can install Oracle Database Gateway in either of the following configurations:

- On the same computer as an existing Oracle database but in a different Oracle home.
- On a system with no Oracle database.
- On the same computer as the Oracle database and in the same Oracle home directory. Note that in this case, the Oracle database and the gateway must be at the same release level.

Gateway Installation Methods

Following are the installation methods to install Oracle Database Gateways:

- Interactive Installation Method
- Automated Installation Method Using Response Files

Interactive Installation Method

When you use the interactive method to install Oracle Database Gateways, Oracle Universal Installer displays a series of screens that enable you to specify all of the required information.
Automated Installation Method Using Response Files

By creating a response file and specifying this file when you start Oracle Universal Installer, you can automate some or all of the Oracle Database Gateway installation. These automated installation methods are useful if you need to perform multiple installations on similarly configured systems or if the system where you want to install the software does not have X Window system software installed.

When you use a response file, you can run Oracle Universal Installer in the following modes, depending on whether you specify all of the required information or not:

- **Silent Mode**
  Oracle Universal Installer runs in silent mode if you use a response file that specifies all required information. None of the Oracle Universal Installer screens are displayed.

- **Suppressed Mode**
  Oracle Universal Installer runs in suppressed mode if you do not specify all required information in the response file. Oracle Universal Installer displays only the screens that prompt for the information that you did not specify.

For more information about these modes and about how to complete an installation using response files, refer to Appendix A, "Using Response Files for Noninteractive Installation".

Installation Considerations

This section contains information that you should consider before installing this product. They are:

- **Release Notes**
- **Hardware and Software Certification**
- **Multiple Oracle Homes Support**

Release Notes

Read the release notes for the product before installing it. The release notes are available on the Oracle Database 12c: Release 1 (12.1) installation media. The latest version of the release notes is also available on the Oracle Technology Network (OTN) Web site:

http://docs.oracle.com

Hardware and Software Certification

The platform-specific hardware and software requirements included in this installation guide were current at the time this guide was published. However, because new platforms and operating system software versions might be certified after this guide is published, review the certification matrix on the My Oracle Support Web site for the most up-to-date list of certified hardware platforms and operating system versions. The My Oracle Support Web site is available at the following Web site:

https://support.oracle.com/
Multiple Oracle Homes Support

This product supports multiple Oracle homes. This means that you can install this release or previous releases of the software more than once on the same system, in different Oracle home directories.

Installing the Software on a System with an Existing Oracle Installation

You must install this product in a new Oracle home directory. You cannot install products from one release of Oracle Database Gateways into an Oracle home directory of a different release. For example, you cannot install 12c Release 1 (12.1) software into an existing Oracle 11g Release 2 (11.2) Oracle home directory. If you attempt to install this release in an Oracle home directory that contains software from an earlier Oracle release, then the installation will fail.

You can install this release more than once on the same system if each installation is installed in a separate Oracle home directory.

Oracle Database Gateway Upgrades

Upgrades are not supported for Oracle Database Gateways.

Accessing the Installation Software

You can access the Oracle Database Gateway software by using one of the following methods:

- Downloading Oracle Software from the OTN Web Site.
- Copying the Oracle Software

Downloading Oracle Software from the OTN Web Site

This section describes how to download the installation archive files and extract them to your system. It contains the following topics:

- Downloading the Installation Archive Files from OTN
- Extracting the Installation Files

Downloading the Installation Archive Files from OTN

To download the installation archive files from Oracle Technology Network do the following:

1. Use any browser to access the software download page on Oracle Technology Network:


2. Navigate to the download page for the product that you want to install.

3. Select a file system with enough free space to store and expand the archive files.

   In most cases, the available drive space must be at least twice the size of the archive files.

4. On the file system that you selected in step 3, create a directory, for example, gateway, to hold the installation archive files.

5. Download the installation archive files to the directory that you created in step 4.
6. Verify that the files you downloaded are the same size as the corresponding files on Oracle Technology Network.

**Extracting the Installation Files**

To extract the installation archive files, perform the following steps:

1. If necessary, change directory to the directory that contains the downloaded installation archive files.

2. If the downloaded file has the `zip` extension, use the following command to extract the content:
   
   ```
   unzip file_name.zip
   ```

   If the downloaded file has the `cpio.gz` extension, use the following command:

   ```
   $ gunzip filename.cpio.gz
   ```

   This command creates files with names similar to the following:

   `filename.cpio`

3. To extract the installation files, enter a command similar to the following:

   ```
   $ cpio -idmv < filename.cpio
   ```

   For each file, this command creates a subdirectory named `gateways`.

**Note:** Refer to the download page for information about the correct options to use with the `cpio` command.

Some browsers uncompress files while downloading them, but leave the `.gz` file extension. If these steps do not work, remove the `.gz` extension from the files and repeat step 3.

---

**Copying the Oracle Software**

Before installing Oracle Database Gateway, you might want to copy the software to a local directory. This enables the installation process to run faster.

To copy the contents of the installation media to a local directory:

1. Create a directory to hold the Oracle Database Gateway software:

   ```
   $ mkdir gateway
   ```

2. Change directory to the directory you created in step 1:

   ```
   $ cd gateway
   ```

3. Copy the contents to the new directory as follows:

   ```
   $ cp -R /directory_path gateway
   ```

   In this example, `/directory_path` is the installation media mount point directory. The mount point directory is `/cdrom.`
Running the Oracle Universal Installer

In most cases, you use the graphical user interface (GUI) provided by Oracle Universal Installer to install the gateway. However, you can also use Oracle Universal Installer to complete noninteractive installations, without using the GUI.

See Also: Refer to Appendix A, "Using Response Files for Noninteractive Installation" for information about noninteractive installations and other advanced installation topics

Start the Installer and install the software, as follows:

1. Log in as the Oracle software owner user (oracle) and set the DISPLAY environment variable.

2. To start the Installer, enter the following commands where directory_path is the directory path of the software.

   $ /directory_path/runInstaller

3. Use the following guidelines to complete the installation:
   - Follow the instruction displayed in the Installer window. If you need additional information, click Help.
   - When the Installer prompts you to run a script with root privileges, enter a command similar to the following in a terminal where you are logged in as the root user, then click Continue or OK:

     # /script_path/script_name

   - If you encounter errors while installing or linking the software, then see Appendix B, "Oracle Database Gateway Troubleshooting" for information about troubleshooting.

4. When the installation is complete, click Exit and then click Yes to exit from the Installer.

Installing and Configuring in Cluster Environments

Oracle Database Gateway can be installed in the existing Oracle Database home or in a separate gateway home, on all nodes. Oracle OUI can install Oracle Database Gateway on either all nodes or selective nodes.

Oracle recommends not to use the listener from the Oracle Database Gateway home. Instead configure the listener in Grid home. By default a local listener is created during cluster configuration that runs out of the grid infrastructure home and listens on the specified port (default is 1521) of the node Virtual IP(VIP).

Support for Single Client Access Name (SCAN)

Oracle Database 11g Release 2 and higher clients connect to the database using Support for Single Client Access Name (SCAN). It provides a single name to the clients connecting to Oracle RAC that does not change throughout the life of the cluster, even if you add or remove nodes from the cluster. Clients connecting with SCAN can use a simple connection string, such as a thin JDBC URL or EZConnect, and achieve load balancing and client connection failover.

In addition to the three SCAN listeners (one per virtual IP address), there is a node listener on every node hosting a database instance. The purpose of using two layers of
listeners (SCAN listeners and node listeners) is to separate the two functions of listeners in an Oracle RAC, firstly to load balance connections and secondly to spawn-and-bequeath sessions. The SCAN listeners will receive connection requests from clients, randomly distributed by the GNS (Grid Naming Services). The SCAN listener will then use load balancing metrics to redirect the request intelligently to the node listener on the node best able to offer the requested service. Database instances register with the SCAN listeners as remote listeners, and with the node listeners as local listeners.

Oracle Database Gateway can not be configured with SCAN, a single name for Database to connect to the gateway. There are two reasons for this. Gateway does not work with remote listeners. Unlike Database where you can specify `REMOTE_LISTENER` to set to the SCAN listener, there is no support for it in Oracle Database Gateways. This is essential for SCAN listener to route the connection to the node listener. Secondly, the gateway does not register with the cluster for it to be managed as a cluster resource.

For gateway, SCAN is not very useful when the Oracle Database and Oracle Database Gateway are running on the same cluster. Oracle Database Gateway can be installed and configured on each node where database is installed, and database can be configured such that each instance connect to the Gateway running on the same node.

**Local Listener**

Oracle Database Gateway service should be configured using the local listener. It is the local listener that spawns the gateway process. That means listener should know which gateway process to spawn. Use the `listener.ora` in Grid infrastructure home to add the Gateway SID. If a SCAN listener for Database is already running on that node, you can use the same listener.ora file to configure the local listener.

**Load Balancing and Transparent Application Failover (TAF)**

Oracle Database Gateway itself does not support either the client-side (using tnsnames in database home) or server-side (using SCAN) load balancing. Load balancing at the Gateway level is not applicable because the Gateway process is currently dedicated to a single session. However, by associating a different Oracle Database Gateway instance for each database instance, you can achieve node level load balancing, that is, selecting a least loaded node happens through load balancing on the database.

Oracle Database Gateway supports connection failover feature. If you configure client-side connection load balancing for Gateway, it works similar to failover. Whenever database fail over happens, that is, session migrates from one database instance to other database instance (on a new node), the migrated session will use the gateway instance from that new node.

Three types of Oracle Net failover functionality are available by default to Oracle Call Interface (OCI) applications:

- **session**: Set to failover the session. If a user connection is lost, then a new session is automatically created for the user on the backup. This type of failover does not attempt to recover select operations.
- **select**: Set to enable users with open cursors to continue fetching on them after failure. However, this mode involves overhead on the client side in normal select operations.
- **none**: This is the default. No failover functionality is used. This can also be explicitly specified to prevent failover from happening.
For failover to work, `tnsnames.ora` in Database home need to be configured with multiple listener addresses.

If the instance fails after the connection, then the TAF application fails over to the other node's listener, reserving any `SELECT` statements in progress.

In the following example of `tnsnames.ora` for load balancing that only works as failover, the database connects to the gateway on host `gateway2-server` only if the gateway on `gateway1-server` is not available:

dg4sybs.us.example.com=
  (DESCRIPTION=
    (LOAD_BALANCE=on)
    (FAILOVER=on)
    (ADDRESS=
      (PROTOCOL=tcp)
      (HOST=gateway1-server)
      (PORT=1521))
    (ADDRESS=
      (PROTOCOL=tcp)
      (HOST=gateway2-server)
      (PORT=1521))
  )
CONNECT_DATA=
  (SERVICE_NAME=dg4sybs.us.example.com) (HS=OK)
  (FAILOVER_MODE=
    (TYPE=select)
    (METHOD=basic)))}
Part II, "Installing and Configuring Oracle Database Gateway for Sybase" describes how to install and configure Oracle Database Gateway for Sybase on UNIX based platforms.

It contains the following chapters:

- Chapter 2, " Installing Oracle Database Gateway for Sybase"
- Chapter 3, "Configuring Oracle Database Gateway for Sybase"
This chapter provides information about the hardware and software requirements and the installation procedure for Oracle Database Gateway for Sybase.

To install the gateway, follow these steps:

1. Ensure that the system meets all of the hardware and software requirements specified in “System Requirements for Oracle Database Gateway for Sybase” on page 2-1.

2. Run the Oracle Universal Installer.

   See “Step Through the Oracle Universal Installer” on page 2-4 for more information about running the Oracle Universal Installer.

Oracle Universal Installer is a menu-driven utility that guides you through the installation of the gateway by prompting you with action items. The action items and the sequence in which they appear depend on your platform.

See Table 2–3 for a description of the installation procedure of Oracle Database Gateway for Sybase.

### System Requirements for Oracle Database Gateway for Sybase

This section provides information about the hardware and software requirements for the gateway. It contains the following sections:

- “Hardware Requirements” on page 2-1
- “Software Requirements” on page 2-3

### Hardware Requirements

Table 2–1 lists the minimum hardware requirements for Oracle Database Gateway for Sybase.

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for Oracle Solaris on x86-64 (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Disk Space</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
</tr>
<tr>
<td>Disk Space</td>
<td>1.5 GB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>1.5 GB</td>
</tr>
</tbody>
</table>
* The minimum swap space is 1 GB (or twice the size of RAM). On systems with 2 GB or more of RAM, the swap space can be between one and two times the size of RAM. On AIX systems with 1 GB or more of memory, do not increase the swap space more than 2 GB.

### Checking the Hardware Requirements

To ensure that the system meets the minimum requirements, follow these steps:

1. To determine the physical RAM size, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># /usr/sbin/lsattr -E -l sys0 -a realmem</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># grep MemTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># /usr/sbin/prtconf</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># /usr/sbin/prtconf</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># /usr/contrib/bin/machinfo</td>
</tr>
</tbody>
</table>

   If the size of the physical RAM installed in the system is less than the required size, you must install more memory before continuing.

2. To determine the size of the configured swap space, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># /usr/sbin/lsps -a</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># grep SwapTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># /usr/sbin/swap -s</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># /usr/sbin/swap -s</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># /usr/sbin/swapinfo -a</td>
</tr>
</tbody>
</table>

   If necessary, see your operating system documentation for information about how to configure additional swap space.

3. To determine the amount of disk space available in the /tmp directory enter the following commands:
4. To determine the amount of disk space available on the system enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># bdf /tmp</td>
</tr>
</tbody>
</table>

### Software Requirements

The following section describes the minimum software requirements for Oracle Database Gateway for Sybase.

### Operating System

**Table 2–2** lists the minimum operating system version required for Oracle Database Gateway for Sybase. If your operating system is lower than the minimum requirements, upgrade your operating system to meet the specified levels.

**Table 2–2   Operating Systems Version for Oracle Database Gateway for Sybase**

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>AIX 5L version 5.3 TL9 or higher, AIX 6.1</td>
</tr>
<tr>
<td>Linux x86 64 bit Red Hat</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>- Red Hat Enterprise Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>- Red Hat Enterprise Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>- Red Hat Enterprise Linux 6</td>
</tr>
<tr>
<td>Oracle Linux x86 64 bit</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>- Oracle Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>- Oracle Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>- Oracle Linux 5 Update 5 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
<tr>
<td></td>
<td>- Oracle Linux 6</td>
</tr>
<tr>
<td></td>
<td>- Oracle Linux 6 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
</tbody>
</table>
Checking the Software Requirements

To ensure that the system meets the minimum requirements, follow these steps:

- To determine which version of IBM AIX on POWER Systems (64-Bit) is installed, enter the following command:
  
  ```bash
  # oslevel -r
  ```

- To determine which distribution and version of Linux x86 64 bit is installed, enter the following command:
  
  ```bash
  # cat /proc/version
  ```

- To determine which version of Oracle Solaris on SPARC (64-Bit) is installed, enter the following command:
  
  ```bash
  # uname -r
  ```

- To determine which version of Oracle Solaris on x86-64 (64-Bit) is installed, enter the following command:
  
  ```bash
  # uname -r
  ```

- To determine which version of HP-UX Itanium is installed, enter the following command:
  
  ```bash
  # uname -a
  ```

Certified Configuration

The gateway supports Sybase Adaptive Server. For the latest versions supported refer to the OTN Web site:


Step Through the Oracle Universal Installer

Table 2–3 describes the installation procedure for Oracle Database Gateway for Sybase.
Step Through the Oracle Universal Installer

Installing Oracle Database Gateway for Sybase

Table 2–3  The Oracle Universal Installer: Steps for Installing the Gateway

<table>
<thead>
<tr>
<th>Screen</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Universal Installer: Welcome</td>
<td>Click Next.</td>
</tr>
</tbody>
</table>
| Oracle Universal Installer: File Locations | The Source section of the screen is where you specify the source location that the Oracle Universal Installer must use to install the Oracle Database Gateway for Sybase. You need not edit the file specification in the Path field. The default setting for this field points to the installer file on your Oracle Database Gateway installation media.  
The Path field in the Destination section of the File Locations screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the File Locations screen as necessary, click Next to continue. After loading the necessary information from the installation media, the Oracle Universal Installer displays the Available Products screen. |
b. Click Next. |
| Oracle Database Gateway for Sybase | Sybase Database Server Host Name - Specify the host name or the IP address of the machine hosting the Sybase database server. This release supports IPv6 format.  
Sybase Database Server Port number - Specify the port number of the Sybase database server  
Sybase Database Name - Specify the Sybase database name  
Click Next to continue. |
| Oracle Universal Installer: Summary | The Installation Summary screen enables you to review a tree list of options and components for this installation. Click Install to start installation. |
| Oracle Net Configuration Assistant: Welcome | Click Cancel |
| Oracle Net Configuration Assistant: | Click Yes |
| Oracle Universal Installer: Configuration Tools | Click Exit |
| Exit | The final screen of the Oracle Universal Installer is the End of Installation screen. Click Exit to exit the installer. |
After installing the gateway, perform the following tasks to configure Oracle Database Gateway for Sybase:

1. **Configure the Gateway Initialization Parameter File**
2. **Configure Oracle Net for the Gateway**
3. **Configure the Oracle Database for Gateway Access**
4. **Create Database Links**
5. **Configure Two-Phase Commit**
6. **Create Sybase Views for Data Dictionary Support**
7. **Encrypt Gateway Initialization Parameter Values**
8. **Configure the Gateway to Access Multiple Sybase Databases**

### Configure the Gateway Initialization Parameter File

Perform the following tasks to configure the gateway initialization parameter file.

1. **Choose a System Identifier for the Gateway**
2. **Customize the Initialization Parameter File**

### 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 `dg4sybs`.

You can define a gateway SID, but using the default of `dg4sybs` 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 only one Sybase database and want to access it sometimes with one set of gateway parameter settings, and other times with different gateway parameter settings, then you will need multiple gateway SIDs for the single Sybase database.
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/dg4sybs/admin/initdg4sybs.ora

Where $ORACLE_HOME is the directory under which the gateway is installed.

This initialization file is for the default gateway SID. If you are not using dg4sybs as the gateway SID, you must rename the initialization parameter file using the SID you chose in the preceding step "Choose a System Identifier for the Gateway" on page 3-1. This default initialization parameter file is sufficient for starting the gateway, verifying a successful installation, and running the demonstration scripts.

A number of initialization parameters can be used to modify the gateway behavior. Refer to Appendix C, "Initialization Parameters" for the complete list of initialization parameters that can be set. Changes made to the initialization parameters only take effect in the next gateway session. The most important parameter is the HS_FDS_CONNECT_INFO, which describes the connection to the non-Oracle system.

The default initialization parameter file already has an entry for this parameter. The syntax for HS_FDS_CONNECT_INFO is as follows:

HS_FDS_CONNECT_INFO=host_name:port_number/database_name

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_name</td>
<td>is the host name or IP address of the machine hosting the Sybase database.</td>
</tr>
<tr>
<td>port_number</td>
<td>is the port number of the Sybase database server.</td>
</tr>
<tr>
<td>database_name</td>
<td>is the Sybase database name.</td>
</tr>
</tbody>
</table>

This release of gateway can support IPv6. If IPv6 address format is to be specified, you have to wrap it with square brackets to indicate the separation from the port number. For example,

HS_FDS_CONNECT_INFO=[2001:0db8:20C:F1FF:FEC6:38AF]:1300/my_db

See Also: Appendix C, "Initialization Parameters" and the Oracle Database Heterogeneous Connectivity User’s Guide for more information about customizing the initialization parameter file.

Configure Oracle Net for the Gateway

The gateway requires Oracle Net to communicate with the Oracle database. After configuring the gateway, perform the following tasks to configure Oracle Net to work with the gateway:

1. Configure Oracle Net Listener for the Gateway
2. Stop and Start the Oracle Net Listener for the Gateway
Configure Oracle Net Listener for the Gateway

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

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

- A list of Oracle Net addresses on which the Oracle Net Listener listens
- The executable name of the gateway that the Oracle Net Listener starts in response to incoming connection requests

A sample of the listener.ora entry (listener.ora.sample) is available in the $ORACLE_HOME/dg4sybs/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

Syntax of listener.ora File Entries

The Oracle database communicates with the gateway using Oracle Net and any supported protocol adapters. The following is the syntax of the address on which the Oracle Net Listener listens using the TCP/IP protocol adapter:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_name</td>
<td>is the name of the machine on which the gateway is installed. IPv6 format is supported with this release. Refer to Oracle Database Net Services Reference for detail.</td>
</tr>
<tr>
<td>port_number</td>
<td>specifies the port number used by the Oracle Net Listener. If you have other listeners running on the same machine, then the value of port_number must be different from the other listeners’ port numbers.</td>
</tr>
</tbody>
</table>

To direct the Oracle Net Listener to start the gateway in response to incoming connection requests, add an entry to the listener.ora file.

Note: You must use the same SID value in the listener.ora file and the tnsnames.ora file that will be configured in the next step.

For AIX, Solaris SPARC, and Linux:

SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
      (PROGRAM=dg4sybs)
    )
  )
For HP-UX Itanium:

SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
      (ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4sybs/driver/lib:oracle_home_directory/lib)
      (PROGRAM=dg4sybs)
    )
  )

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the tnsnames.ora file.</td>
</tr>
<tr>
<td>oracle_home_directory</td>
<td>specifies the Oracle home directory where the gateway resides.</td>
</tr>
<tr>
<td>dg4sybs</td>
<td>specifies the executable name of the Oracle Database Gateway for Sybase.</td>
</tr>
</tbody>
</table>

If you already have an existing Oracle Net Listener, then add the following syntax to SID_LIST in the existing listener.ora file:

For AIX, Solaris SPARC, and Linux:

SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=.
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
      (PROGRAM=dg4sybs)
    )
  )

For HP-UX Itanium:

SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=.
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
      (ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4sybs/driver/lib:oracle_home_directory/lib)
      (PROGRAM=dg4sybs)
    )
  )
Stop and Start the Oracle Net Listener for the Gateway

You must stop and restart the Oracle Net Listener to initiate the new settings, as follows:

1. Set the `PATH` environment variable to `$ORACLE_HOME/bin` where `$ORACLE_HOME` is
the directory in which the gateway is installed.

   For example on the Linux platform, if you have the Bourne or Korn Shell, enter the
   following:
   
   ```
   $ PATH=$ORACLE_HOME/bin:$PATH; export PATH
   $ LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH
   ```

   If you have the C Shell, enter the following:
   
   ```
   $ setenv PATH $ORACLE_HOME/bin:$PATH
   $ setenv LD_LIBRARY_PATH $ORACLE_HOME/lib:$LD_LIBRARY_PATH
   ```

   Table 3–1 specifies which parameter value to use for the different platforms:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris (SPARC) 64 bit and</td>
<td><code>LD_LIBRARY_PATH_64=$ORACLE_HOME/lib</code></td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td><code>LD_LIBRARY_PATH=$ORACLE_HOME/lib</code></td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td><code>LD_LIBRARY_PATH=$ORACLE_HOME/lib</code></td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td><code>LIBPATH=$ORACLE_HOME/lib</code></td>
</tr>
</tbody>
</table>

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 a partial output from a `lsnrctl status` check:

   ```
   Services Summary...
   Service 'dg4sybs' has 1 instance(s).
   Instance 'dg4sybs', status UNKNOWN, has 1 handler(s) for this service...
   The command completed successfully
   ```

   In this example, the service name is `dg4sybs`, which is the default SID value assigned
during installation.
Configure the Oracle Database for Gateway Access

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

To configure the Oracle database you must add connect descriptors to the tnsnames.ora file. By default, this file is in $ORACLE_HOME/network/admin, where $ORACLE_HOME is the directory in which the Oracle database is installed. You cannot use the Oracle Net Assistant or the Oracle Net Easy Config tools to configure the tnsnames.ora file. You must edit the file manually.

A sample of the tnsnames.ora entry (tnsnames.ora.sample) is available in the $ORACLE_HOME/dg4sybs/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

Configuring tnsnames.ora

Edit the tnsnames.ora file to add a connect descriptor for the gateway. The following is the syntax of the Oracle Net entry using the TCP/IP protocol:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect_descriptor</td>
<td>is the description of the object to connect to as specified when creating the database link, such as dg4sybs. Check the sqlnet.ora file for the following parameter setting: names.directory_path = (TNSNAMES)</td>
</tr>
<tr>
<td>TCP</td>
<td>is the TCP protocol used for TCP/IP connections.</td>
</tr>
<tr>
<td>host_name</td>
<td>specifies the machine where the gateway is running.</td>
</tr>
<tr>
<td>port_number</td>
<td>matches the port number used by the Oracle Net Listener that is listening for the gateway. The Oracle Net Listener’s port number can be found in the listener.ora file used by the Oracle Net Listener. See “Syntax of listener.ora File Entries” on page 3-3.</td>
</tr>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway and matches the SID specified in the listener.ora file of the Oracle Net Listener that is listening for the gateway. See “Configure Oracle Net Listener for the Gateway” on page 3-3 for more information.</td>
</tr>
<tr>
<td>(HS=OK)</td>
<td>specifies that this connect descriptor connects to a non-Oracle system.</td>
</tr>
</tbody>
</table>
Configuring tnsnames.ora for Multiple Listeners

To ensure higher availability, you can specify multiple listeners within the connect descriptor.

```
connect_descriptor=
|DESCRIPTION=
  |ADDRESS=  
    |(PROTOCOL=TCP)  
    |(HOST=host_name_1)  
    |(PORT=port_number_1)  
  )  
  |ADDRESS=  
    |(PROTOCOL=TCP)  
    |(HOST=host_name_2)  
    |(PORT=port_number_2)  
  )  
  |CONNECT_DATA=  
    |(SID=gateway_sid)  
    |(HS=OK))
```

This indicates that, if the listener for `host_name_1` and `port_number_1` is not available, then the second listener for `host_name_2` and `port_number_2` will take over.

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

Create Database Links

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

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 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.

To access the Sybase server, you must create a database link. A public database link is the most common of database links.

```
SQL> CREATE PUBLIC DATABASE LINK dblink CONNECT TO  
       'user' IDENTIFIED BY 'password' USING 'tns_name_entry';
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dblink</td>
<td>is the complete database link name.</td>
</tr>
<tr>
<td>tns_name_entry</td>
<td>specifies the Oracle Net connect descriptor specified in the tnsnames.ora file that identifies the gateway</td>
</tr>
</tbody>
</table>

After the database link is created you can verify the connection to the Sybase database, as follows:

```
SQL> SELECT * FROM DUAL@dblink;
```
See Also: Oracle Database Administrator’s Guide and Oracle Database Heterogeneous Connectivity User’s Guide for more information about using database links.

Configure Two-Phase Commit

The gateway supports the following transaction capabilities:

- COMMIT_CONFIRM
- READ_ONLY
- SINGLE_SITE

The transaction model is set using the HS_TRANSACTION_MODEL initialization parameter. 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 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 instance can participate in an Oracle two-phase commit transaction as the commit point site.

See Also: Oracle Database Heterogeneous Connectivity User’s Guide for information about the two-phase commit process.

To enable the COMMIT_CONFIRM transaction mode, perform the following tasks:

1. Create a Recovery Account and Password
2. Create the Transaction Log Table

The log table, called HS_TRANSACTION_LOG, is where two-phase commit transactions are recorded. Alternatively, users can specify a different table name by setting a gateway initialization parameter HS_FDS_TRANSACTION_LOG parameter. This table needs to be in the same schema as the recovery account.

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 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 dg4pwd that should be used for encryption. Refer to Section 4.2.3, ‘Encrypting Initialization parameters’ in the Oracle Database Heterogeneous Connectivity User’s 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:** "Customize the Initialization Parameter File" on page 3-2 for information about editing the initialization parameter file. For information about **HS_FDS_RECOVERY_ACCOUNT** and **HS_FDS_RECOVERY_PWD**, see Appendix C, "Initialization Parameters".

### 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.

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 C, "Initialization Parameters" for information about the **HS_FDS_TRANSACTION_LOG** initialization parameter.

Create the transaction log table in the user account you created in "Create a Recovery Account and Password" on page 3-8. 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 `dg4sybs_tx.sql` script, located in the directory `$ORACLE_HOME/dg4sybs/admin` where `$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] -idg4sybs_tx.sql
```
Create Sybase Views for Data Dictionary Support

To enable Oracle data dictionary translation support use the $dg4sybs_cvw.sql script, located in the directory $ORACLE_HOME/dg4sybs/admin where $ORACLE_HOME is the directory under which the gateway is installed. You must run this script on each Sybase database that you want to access through the gateway. Use isql to execute the script, as follows:


where sa_user and sa_pwd are the Sybase system administrator user ID and password respectively.

Encrypt Gateway Initialization Parameter Values

The gateway uses user IDs and passwords to access the information in the remote database. Some user IDs 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 dg4pwd encryption utility has been added as part of Heterogeneous Services to help make this more secure. This utility is accessible by this gateway. The initialization parameters that contain sensitive values can be stored in an encrypted form.

See Also: Oracle Database Heterogeneous Connectivity User’s Guide for more information about using this utility.

Configure the Gateway to Access 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 dg4sybs
- 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 host with IP Address 204.179.79.15 are being added

Create Two Initialization Parameter Files

Create an initialization parameter file for each instance of the gateway by copying the original initialization parameter file, $ORACLE_
Configure the Gateway to Access Multiple Sybase Databases

Configure the Gateway to Access Multiple Sybase Databases

HOME/dg4sybs/admin/initdg4sybs.ora, twice, naming one with the gateway SID for 
db2 and the other with the gateway SID for db3:

$ cd $ORACLE_HOME/dg4sybs/admin
$ cp initdg4sybs.ora initdg4sybs2.ora
$ cp initdg4sybs.ora initdg4sybs3.ora

Change the value of the HS_FDS_CONNECT_INFO parameter in the new files.

For initdg4sybs2.ora, enter the following:

HS_FDS_CONNECT_INFO=204.179.79.15:5000/db2

For initdg4sybs3.ora, enter the following:

HS_FDS_CONNECT_INFO=204.179.79.15:5000/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 Sybase Databases Example: Configuring Oracle Net Listener

Add Entries to listener.ora

Add two new entries to the Oracle Net 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=dg4sybs} 
  {ORACLE_HOME=oracle_home_directory} 
  {PROGRAM=dg4sybs} 
 }
 {SID_DESC=
  {SID_NAME=dg4sybs2} 
  {ORACLE_HOME=oracle_home_directory} 
  {PROGRAM=dg4sybs} 
 }
 {SID_DESC=
  {SID_NAME=dg4sybs3} 
  {ORACLE_HOME=oracle_home_directory} 
  {PROGRAM=dg4sybs} 
 }
}

where, oracle_home_directory is the directory where the gateway resides.

Multiple Sybase Databases Example: Stopping and Starting the Oracle Net 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 Sybase Databases Example: Configuring Oracle Database for Gateway Access

Configuring Oracle Net for Multiple Gateway Instances

Add two connect descriptor entries to the \texttt{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:

\begin{verbatim}
old_db_using=(DESCRIPTION=
          (ADDRESS=
            (PROTOCOL=TCP)
            (PORT=port_number)
            (HOST=host_name))
          (CONNECT_DATA=
            (SID=dg4sybs))
          (HS=OK))
new_db2_using=(DESCRIPTION=
          (ADDRESS=
            (PROTOCOL=TCP)
            (PORT=port_number)
            (HOST=host_name))
          (CONNECT_DATA=
            (SID=dg4sybs2))
          (HS=OK))
new_db3_using=(DESCRIPTION=
          (ADDRESS=
            (PROTOCOL=TCP)
            (PORT=port_number)
            (HOST=host_name))
          (CONNECT_DATA=
            (SID=dg4sybs3))
          (HS=OK))
\end{verbatim}

The value for \texttt{PORT} is the TCP/IP port number of the Oracle Net Listener that is listening for the gateway. The number can be found in the \texttt{listener.ora} file used by the Oracle Net Listener. The value for \texttt{HOST} is the name of the machine on which the gateway is running. The name also can be found in the \texttt{listener.ora} file used by the Oracle Net Listener.

Multiple Sybase Databases Example: Accessing Sybase Data

Enter the following to create a database link for the \texttt{dg4sybs2} gateway:

\begin{verbatim}
SQL> CREATE PUBLIC DATABASE LINK SYBS2 CONNECT TO 2  "user2" IDENTIFIED BY "password2" USING new_db2_using;
\end{verbatim}

Enter the following to create a database link for the \texttt{dg4sybs3} gateway:

\begin{verbatim}
SQL> CREATE PUBLIC DATABASE LINK SYBS3 CONNECT TO 2  "user3" IDENTIFIED BY "password3" USING new_db3_using;
\end{verbatim}

After the database links are created, you can verify the connection to the new Sybase databases, as in the following:
Configure the Gateway to Access Multiple Sybase Databases

SQL> SELECT * FROM ALL_USERS@SYBS2;

SQL> SELECT * FROM ALL_USERS@SYBS3;
Part III, "Installing and Configuring Oracle Database Gateway for Informix" describes how to install and configure Oracle Database Gateway for Informix on UNIX based platforms.

It contains the following chapters:

- Chapter 4, "Installing Oracle Database Gateway for Informix"
- Chapter 5, "Configuring Oracle Database Gateway for Informix"
Installing Oracle Database Gateway for Informix

This chapter provides information about the hardware and software requirements and the installation procedure for Oracle Database Gateway for Informix.

To install the gateway, follow these steps:

1. Ensure that the system meets all of the hardware and software requirements specified in "System Requirements for Oracle Database Gateway for Informix" on page 4-1.

2. Run the Oracle Universal Installer.

See "Step Through the Oracle Universal Installer" on page 4-4 for more information about running the Oracle Universal Installer

Oracle Universal Installer is a menu-driven utility that guides you through the installation of the gateway by prompting you with action items. The action items and the sequence in which they appear depend on your platform.

See Table 4–3 for a description of the installation procedure of Oracle Database Gateway for Informix.

System Requirements for Oracle Database Gateway for Informix

This section provides information about the hardware and software requirements for the gateway. It contains the following sections:

- "Hardware Requirements" on page 4-1
- "Software Requirements" on page 4-3

Hardware Requirements

Table 4–1 lists the minimum hardware requirements for Oracle Database Gateway for Informix.

Table 4–1 Hardware Requirements for Oracle Database Gateway for Informix

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for Oracle Solaris on x86-64 (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Disk Space</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB (64-Bit)</td>
<td>400 MB (64-Bit)</td>
<td>400 MB</td>
</tr>
</tbody>
</table>
Table 4–1 (Cont.) Hardware Requirements for Oracle Database Gateway for Informix

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for Oracle Solaris on x86-64 (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk Space</td>
<td>1.5 GB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>1.5 GB</td>
</tr>
<tr>
<td>Physical Memory*</td>
<td>512 MB</td>
<td>512 MB</td>
<td>512 MB</td>
<td>512 MB</td>
<td>512 MB</td>
</tr>
<tr>
<td>Swap Space</td>
<td>1 GB</td>
<td>1 GB</td>
<td>1 GB</td>
<td>1 GB</td>
<td>1 GB</td>
</tr>
<tr>
<td>Processor</td>
<td>IBM RS/6000 AIX-Based System Processor</td>
<td>x86_64</td>
<td>Sun Solaris Operating System (SPARC) Processor</td>
<td>x86_64</td>
<td>HP Itanium processor for hp-ux 11</td>
</tr>
</tbody>
</table>

* The minimum swap space is 1 GB (or twice the size of RAM). On systems with 2 GB or more of RAM, the swap space can be between one and two times the size of RAM. On AIX systems with 1 GB or more of memory, do not increase the swap space more than 2 GB.

Checking the Hardware Requirements

To ensure that the system meets the minimum requirements, follow these steps:

1. To determine the physical RAM size, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>/usr/sbin/lsattr -E -l sys0 -a</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>grep MemTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td>/usr/sbin/prtconf</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td>/usr/sbin/prtconf</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>/usr/contrib/bin/machinfo</td>
</tr>
</tbody>
</table>

   If the size of the physical RAM installed in the system is less than the required size, you must install more memory before continuing.

2. To determine the size of the configured swap space, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>/usr/sbin/lsp -a</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>grep SwapTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td>/usr/sbin/swap -s</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td>/usr/sbin/swap -s</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>/usr/sbin/swapinfo -a</td>
</tr>
</tbody>
</table>

   If necessary, see your operating system documentation for information about how to configure additional swap space.
3. To determine the amount of disk space available in the `/tmp` directory enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td><code># bdf /tmp</code></td>
</tr>
</tbody>
</table>

4. To determine the amount of disk space available on the system enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td><code># bdf</code></td>
</tr>
</tbody>
</table>

Software Requirements

The following section describes the minimum software requirements for Oracle Database Gateway for Informix.

Operating System

Table 4–2 lists the minimum operating system version required for Oracle Database Gateway for Informix. If your operating system is lower than the minimum requirements, upgrade your operating system to meet the specified levels.

Table 4–2 Operating Systems Version for Oracle Database Gateway for Informix

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>AIX 5L version 5.3 TL9 or higher, AIX 6.1</td>
</tr>
<tr>
<td>Linux x86 64 bit Red Hat</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 6</td>
</tr>
<tr>
<td>Oracle Linux x86 64 bit</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 5 Update 5 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 6</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 6 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
</tbody>
</table>
Checking the Software Requirements

To ensure that the system meets the minimum requirements, follow these steps:

- To determine which version of IBM AIX on POWER Systems (64-Bit) is installed, enter the following command:
  
  ```bash
  # oslevel -r
  ```

- To determine which distribution and version of Linux x86 64 bit is installed, enter the following command:
  
  ```bash
  # cat /proc/version
  ```

- To determine which version of Oracle Solaris on SPARC (64-Bit) is installed, enter the following command:
  
  ```bash
  # uname -r
  ```

- To determine which version of Oracle Solaris on x86-64 (64-Bit) is installed, enter the following command:
  
  ```bash
  # uname -r
  ```

- To determine which version of HP-UX Itanium is installed, enter the following command:
  
  ```bash
  # uname -a
  ```

Certified Configuration

The gateway supports Informix Dynamic Server. For the latest versions supported refer to the OTN Web site:


Step Through the Oracle Universal Installer

(Table 4-3) describes the installation procedure for Oracle Database Gateway for Informix.

---

**Table 4-2 (Cont.) Operating Systems Version for Oracle Database Gateway for Informix**

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asianux Linux 64 bit</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Asianux Linux 2.0</td>
</tr>
<tr>
<td></td>
<td>■ Asianux Linux 3.0</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 64 bit</td>
<td>SUSE Linux Enterprise Server 10.0</td>
</tr>
<tr>
<td></td>
<td>SUSE Linux Enterprise Server 11.0</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td>Solaris 10, (Update 6 or later)</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td>■ Oracle Solaris 10 U6 (5.10-2008.10)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Solaris 11 11/11 X86 and higher</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>HP-UX 11i V3 patch Bundle Sep/ 2008 (B.11.31.0809.326a) or higher</td>
</tr>
</tbody>
</table>
### Table 4–3  The Oracle Universal Installer: Steps for Installing the Gateway

<table>
<thead>
<tr>
<th>Screen</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Universal Installer: Welcome</td>
<td>Click Next.</td>
</tr>
<tr>
<td>Oracle Universal Installer: File Locations</td>
<td>The Source section of the screen is where you specify the source location that the Oracle Universal Installer must use to install the Oracle Database Gateway for Informix. You need not edit the file specification in the Path field. The default setting for this field points to the installer file on your Oracle Database Gateway installation media. The Path field in the Destination section of the File Locations screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the File Locations screen as necessary, click Next to continue. After loading the necessary information from the installation media, the Oracle Universal Installer displays the Available Products screen.</td>
</tr>
</tbody>
</table>

b. Click Next. |
| Oracle Database Gateway for Informix | Informix Database Server Host Name - Specify the host name or the IP address of the machine hosting the Informix database server. This release supports IPv6 format.  

Informix Database Server Port number - Specify the port number of the Informix database server  

Informix Server Name - Specify the Informix server name  

Informix Database Name - Specify the Informix database name  

Click Next to continue. |
| Oracle Universal Installer: Summary | The Installation Summary screen enables you to review a tree list of options and components for this installation. Click Install to start installation. |
| Oracle Net Configuration Assistant: Welcome | Click Cancel |
| Oracle Net Configuration Assistant: | Click Yes |
| Oracle Universal Installer: Configuration Tools | Click Exit |
| Exit | The final screen of the Oracle Universal Installer is the End of Installation screen. Click Exit to exit the installer. |
After installing the gateway, perform the following tasks to configure Oracle Database Gateway for Informix:

1. **Configure the Gateway Initialization Parameter File**
2. **Configure Oracle Net for the Gateway**
3. **Configure the Oracle Database for Gateway Access**
4. **Create Database Links**
5. **Configure Two-Phase Commit**
6. **Encrypt Gateway Initialization Parameter Values**
7. **Configure the Gateway to Access Multiple Informix Databases**

### Configure the Gateway Initialization Parameter File

Perform the following tasks to configure the gateway initialization parameter file:

1. **Choose a System Identifier for the Gateway**
2. **Customize the Initialization Parameter File**

### 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 Informix database you are accessing. The SID is used as part of the file name for the initialization parameter file. The default SID is `dg4ifmx`.

You can define a gateway SID, but using the default of `dg4ifmx` is easier because you do not need to change the initialization parameter file name. However, if you want to access two Informix databases, you need two gateway SIDs, one for each instance of the gateway. If you have only one Informix database and want to access it sometimes with one set of gateway parameter settings, and other times with different gateway parameter settings, then you will need multiple gateway SIDs for the single Informix database.

### 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:
Configure Oracle Net for the Gateway

$ORACLE_HOME/dg4ifmx/admin/initdg4ifmx.ora

Where $ORACLE_HOME is the directory under which the gateway is installed.

This initialization file is for the default gateway SID. If you are not using dg4ifmx as the gateway SID, you must rename the initialization parameter file using the SID you chose in the preceding step "Choose a System Identifier for the Gateway" on page 5-1. This default initialization parameter file is sufficient for starting the gateway, verifying a successful installation, and running the demonstration scripts.

A number of initialization parameters can be used to modify the gateway behavior. Refer to Appendix C, "Initialization Parameters" for the complete list of initialization parameters that can be set. Changes made to the initialization parameters only take effect in the next gateway session. The most important parameter is the HS_FDS_CONNECT_INFO, which describes the connection to the non-Oracle system.

The default initialization parameter file already has an entry for this parameter. The syntax for HS_FDS_CONNECT_INFO is as follows:

```
HS_FDS_CONNECT_INFO=host_name:port_number/server_name/database_name
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_name</td>
<td>is the host name or IP address of the machine hosting the Informix database.</td>
</tr>
<tr>
<td>port_number</td>
<td>is the port number of the Informix database server.</td>
</tr>
<tr>
<td>server_name</td>
<td>specifies the Informix database server name.</td>
</tr>
<tr>
<td>database_name</td>
<td>is the Informix database name.</td>
</tr>
</tbody>
</table>

This release of gateway can support IPv6. If IPv6 address format is to be specified, you have to wrap it with square brackets to indicate the separation from the port number. For example,

```
HS_FDS_CONNECT_INFO=[2001:0db8:20C:F1FF:FEC6:38AF]:1300/sr/my_db
```

See Also: Appendix C, "Initialization Parameters" and the Oracle Database Heterogeneous Connectivity User’s Guide for more information about customizing the initialization parameter file.

Configure Oracle Net for the Gateway

The gateway requires Oracle Net to communicate with the Oracle database. After configuring the gateway, perform the following tasks to configure Oracle Net to work with the gateway:

1. Configure Oracle Net Listener for the Gateway
2. Stop and Start the Oracle Net Listener for the Gateway

Configure Oracle Net Listener for the Gateway

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

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

- A list of Oracle Net addresses on which the Oracle Net Listener listens
- The executable name of the gateway that the Oracle Net Listener starts in response
to incoming connection requests

A sample of the listener.ora entry (listener.ora.sample) is available in the
$ORACLE_HOME/dg4ifmx/admin directory where $ORACLE_HOME is the directory under
which the gateway is installed.

Syntax of listener.ora File Entries

The Oracle database communicates with the gateway using Oracle Net and any
supported protocol adapters. The following is the syntax of the address on which the
Oracle Net Listener listens using the TCP/IP protocol adapter:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_name</td>
<td>is the name of the machine on which the gateway is installed. IPv6 format is supported with this release. Refer to Oracle Database Net Services Reference for detail.</td>
</tr>
<tr>
<td>port_number</td>
<td>specifies the port number used by the Oracle Net Listener. If you have other listeners running on the same machine, then the value of port_number must be different from the other listeners’ port numbers.</td>
</tr>
</tbody>
</table>

To direct the Oracle Net Listener to start the gateway in response to incoming
connection requests, add an entry to the listener.ora file.

**Note:** You must use the same SID value in the listener.ora file and the
tnsnames.ora file that will be configured in the next step.

For AIX, Solaris SPARC, and Linux:

```
SID_LIST_LISTENER=
{SID_LIST=
 {SID_DESC=
 {SID_NAME=gateway_sid}
 {ORACLE_HOME=oracle_home_directory}
 {PROGRAM=dg4ifmx}
 }
 }
```

For HP-UX Itanium:

```
SID_LIST_LISTENER=
{SID_LIST=
 {SID_DESC=
 {SID_NAME=gateway_sid}
```
Configure Oracle Net for the Gateway

```plaintext
(ORACLE_HOME=oracle_home_directory)
(ENV=LD_LIBRARY_PATH=oracle_home_directory/dg4ifmx/driver/lib:oracle_home_directory/lib)
(PROGRAM=dg4ifmx)
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway and matches the gateway SID specified</td>
</tr>
<tr>
<td></td>
<td>in the connect descriptor entry in the tnsnames.ora file.</td>
</tr>
<tr>
<td>oracle_home_directory</td>
<td>specifies the Oracle home directory where the gateway resides.</td>
</tr>
<tr>
<td>dg4ifmx</td>
<td>specifies the executable name of the Oracle Database Gateway for Informix.</td>
</tr>
</tbody>
</table>

If you already have an existing Oracle Net Listener, then add the following syntax to SID_LIST in the existing listener.ora file:

For AIX, Solaris SPARC, and Linux:

```plaintext
SID_LIST_LISTENER=
(SID_LIST=
  (SID_DESC=.
   .
  )
  (SID_DESC=.
   .
  )
  (SID_DESC=
    (SID_NAME=gateway_sid)
    (ORACLE_HOME=oracle_home_directory)
    (PROGRAM=dg4ifmx)
  )
)
```

For HP-UX Itanium:

```plaintext
SID_LIST_LISTENER=
(SID_LIST=
  (SID_DESC=.
   .
  )
  (SID_DESC=.
   .
  )
  (SID_DESC=
    (SID_NAME=gateway_sid)
    (ORACLE_HOME=oracle_home_directory)
    (ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4ifmx/driver/lib:oracle_home_directory/lib)
    (PROGRAM=dg4ifmx)
  )
)
```

Variable Description

- **gateway_sid**: specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the tnsnames.ora file.
- **oracle_home_directory**: specifies the Oracle home directory where the gateway resides.
- **dg4ifmx**: specifies the executable name of the Oracle Database Gateway for Informix.
Configure Oracle Net for the Gateway

Stop and Start the Oracle Net Listener for the Gateway

You must stop and restart the Oracle Net Listener to initiate the new settings, as follows:

1. Set the `PATH` environment variable to `$ORACLE_HOME/bin` where `$ORACLE_HOME` is the directory in which the gateway is installed.

   For example on the Linux platform, if you have the Bourne or Korn Shell, enter the following:

   ```bash
   $ PATH=$ORACLE_HOME/bin:$PATH;export PATH
   $ LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH
   ```

   If you have the C Shell, enter the following:

   ```bash
   $ setenv PATH $ORACLE_HOME/bin:$PATH
   $ setenv LD_LIBRARY_PATH $ORACLE_HOME/lib:$LD_LIBRARY_PATH
   ```

   Table 5–1 specifies which parameter value to use for the different platforms:

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:

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

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

   ```bash
   $ lsnrctl status
   ```

   The following is a partial output from a `lsnrctl` status check:

   ```
   Services Summary...
   Service 'dg4ifmx' has 1 instance(s).
   Instance 'dg4ifmx', status UNKNOWN, has 1 handler(s) for this service...
   The command completed successfully
   ```

   In this example, the service name is `dg4ifmx`, which is the default SID value assigned during installation.

See Also: Oracle Database Net Services Administrator’s Guide for information about changing the listener.ora file.

Table 5–1 Parameter Values for UNIX Based Platforms

<table>
<thead>
<tr>
<th>Platform</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris (SPARC) 64 bit and</td>
<td>LD_LIBRARY_PATH_64=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>LIBPATH=$ORACLE_HOME/lib</td>
</tr>
</tbody>
</table>
Configure the Oracle Database for Gateway Access

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

To configure the Oracle database you must add connect descriptors to the tnsnames.ora file. By default, this file is in $ORACLE_HOME/network/admin, where $ORACLE_HOME is the directory in which the Oracle database is installed. You cannot use the Oracle Net Assistant or the Oracle Net Easy Config tools to configure the tnsnames.ora file. You must edit the file manually.

A sample of the tnsnames.ora entry (tnsnames.ora.sample) is available in the $ORACLE_HOME/dg4ifmx/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

Configuring tnsnames.ora

Edit the tnsnames.ora file to add a connect descriptor for the gateway. The following is the syntax of the Oracle Net entry using the TCP/IP protocol:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect_descriptor</td>
<td>is the description of the object to connect to as specified when creating the database link, such as dg4ifmx.</td>
</tr>
<tr>
<td></td>
<td>Check the sqlnet.ora file for the following parameter setting:</td>
</tr>
<tr>
<td></td>
<td>• names.directory_path = (TNSNAMES)</td>
</tr>
<tr>
<td></td>
<td>Note: The sqlnet.ora file is typically stored in $ORACLE_HOME/network/admin.</td>
</tr>
<tr>
<td>TCP</td>
<td>is the TCP protocol used for TCP/IP connections.</td>
</tr>
<tr>
<td>host_name</td>
<td>specifies the machine where the gateway is running.</td>
</tr>
<tr>
<td>port_number</td>
<td>matches the port number used by the Oracle Net Listener that is listening for the gateway. The Oracle Net Listener's port number can be found in the listener.ora file used by the Oracle Net Listener. See &quot;Syntax of listener.ora File Entries&quot; on page 5-3.</td>
</tr>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway and matches the SID specified in the listener.ora file of the Oracle Net Listener that is listening for the gateway. See &quot;Configure Oracle Net Listener for the Gateway&quot; on page 5-2 for more information.</td>
</tr>
<tr>
<td>(HS=OK)</td>
<td>specifies that this connect descriptor connects to a non-Oracle system.</td>
</tr>
</tbody>
</table>

See Also: Oracle Database Administrator’s Guide for information about editing the tnsnames.ora file.
Configuring tnsnames.ora for Multiple Listeners

To ensure higher availability, you can specify multiple listeners within the connect descriptor.

```
correct_connection=  
  |DESCRIPTION=  
  |ADDRESS=      
  |  (PROTOCOL=TCP)  
  |  (HOST=host_name_1)  
  |  (PORT=port_number_1)  
  |}  
  |ADDRESS=      
  |  (PROTOCOL=TCP)  
  |  (HOST=host_name_2)  
  |  (PORT=port_number_2)  
  |}  
  |CONNECT_DATA=  
  |  (SID=gateway_sid)  
  |  (HS=OK))  
```

This indicates that, if the listener for `host_name_1` and `port_number_1` is not available, then the second listener for `host_name_2` and `port_number_2` will take over.

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

Create Database Links

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

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 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 Informix 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.

To access the Informix server, you must create a database link. A public database link is the most common of database links.

```
SQL> CREATE PUBLIC DATABASE LINK dblink CONNECT TO  
  2  "user" IDENTIFIED BY "password" USING 'tns_name_entry';
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dblink</td>
<td>is the complete database link name.</td>
</tr>
<tr>
<td>tns_name_entry</td>
<td>specifies the Oracle Net connect descriptor specified in the tnsnames.ora file that identifies the gateway</td>
</tr>
</tbody>
</table>

After the database link is created you can verify the connection to the Informix database, as follows:

```
SQL> SELECT * FROM DUAL@dblink;
```
Configure Two-Phase Commit

The gateway supports the following transaction capabilities:

- **COMMIT_CONFIRM**
- **READ_ONLY**
- **SINGLE_SITE**

The transaction model is set using the `HS_TRANSACTION_MODEL` initialization parameter. By default, the gateway runs in **COMMIT_CONFIRM** transaction mode. When the Informix database is updated by a transaction, the gateway becomes the commit point site. The Oracle database commits the unit of work in the Informix database after verifying that all Oracle databases in the transaction have successfully prepared the transaction. Only one gateway instance can participate in an Oracle two-phase commit transaction as the commit point site.

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

To enable the **COMMIT_CONFIRM** transaction mode, perform the following tasks:

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 Informix 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`.

2. **Create the Transaction Log Table**

   The log table, called `HS_TRANSACTION_LOG`, is where two-phase commit transactions are recorded. Alternatively, users can specify a different table name by setting a gateway initialization parameter `HS_FDS_TRANSACTION_LOG` parameter. This table needs to be in the same schema as the recovery account.

**Create a Recovery Account and Password**

For the gateway to recover distributed transactions, a recovery account and password must be set up in the Informix 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 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 `dg4pwd` that should be used for encryption. Refer to Section 4.2.3, ‘Encrypting Initialization parameters’ in the Oracle Database Heterogeneous Connectivity User’s Guide for further details.

1. Set up a user account in the Informix database. Both the user name and password must be a valid Informix 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 Informix user account you set up for recovery.
- **HS_FDS_RECOVERY_PWD** to the password of the Informix user account you set up for recovery.

See Also: Customize the Initialization Parameter File on page 5-1 for information about editing the initialization parameter file. For information about **HS_FDS_RECOVERY_ACCOUNT** and **HS_FDS_RECOVERY_PWD**, see Appendix C, "Initialization Parameters".

Create the Transaction Log Table

When configuring the gateway for two-phase commit, a table must be created in the Informix database for logging transactions. The gateway uses the transaction log table to check the status of failed transactions that were started at the Informix 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 C, "Initialization Parameters" for information about the **HS_FDS_TRANSACTION_LOG** initialization parameter.

Create the transaction log table in the user account you created in Create a Recovery Account and Password on page 5-8. Because the transaction log table is used to record the status of a gateway transaction, the table must reside at the database where the Informix 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 **dg4ifmx.tx.sql** script, located in the directory $ORACLE_HOME/dg4ifmx/admin where $ORACLE_HOME is the directory under which the gateway is installed, as follows:

1. Login as user ID **RECOVER**.
2. Set environment variable **DELMIDENT**.

   If you have the Bourne or Korn Shell, enter the following:
Encrypt Gateway Initialization Parameter Values

The gateway uses user IDs and passwords to access the information in the remote database. Some user IDs 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 dg4pwd encryption utility has been added as part of Heterogeneous Services to help make this more secure. This utility is accessible by this gateway. The initialization parameters that contain sensitive values can be stored in an encrypted form.

See Also: Oracle Database Heterogeneous Connectivity User’s Guide for more information about using this utility.

Configure the Gateway to Access Multiple Informix Databases

The tasks for configuring the gateway to access multiple Informix 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 dg4ifmx.
- The ORACLE_HOME environment variable is set to the directory where the gateway is installed.
- The gateway is configured for one Informix database named db1.
- Two Informix databases named db2 and db3 on a host with IP Address 204.179.79.15 are being added.

Multiple Informix Databases Example: Configuring the Gateway

Choose One System ID for Each Informix Database

A separate instance of the gateway is needed for each Informix database. Each instance needs its own gateway System ID (SID). For this example, the gateway SIDs are chosen for the instances that access the Informix databases:

- dg4ifmx2 for the gateway accessing database db2.
- dg4ifmx3 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/dg4ifmx/admin/initdg4ifmx.ora, twice, naming one with the gateway SID for db2 and the other with the gateway SID for db3:

$ cd $ORACLE_HOME/dg4ifmx/admin

$ cp initdg4ifmx.ora initdg4ifmx2.ora
$ cp initdg4ifmx.ora initdg4ifmx3.ora

Change the value of the HS_FDS_CONNECT_INFO parameter in the new files.
For initdg4ifmx2.ora, enter the following:
HS_FDS_CONNECT_INFO=204.179.79.15:3900/sr2/db2

For initdg4ifmx3.ora, enter the following:
HS_FDS_CONNECT_INFO=204.179.79.15:3900/sr3/db3

Note: If you have multiple gateway SIDs for the same Informix 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 Informix Databases Example: Configuring Oracle Net Listener

Add Entries to listener.ora
Add two new entries to the Oracle Net 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=dg4ifmx)
 (ORACLE_HOME=oracle_home_directory)
 (PROGRAM=dg4ifmx)
 )
 (SID_DESC=(
 (SID_NAME=dg4ifmx2)
 (ORACLE_HOME=oracle_home_directory)
 (PROGRAM=dg4ifmx)
 )
 (SID_DESC=(
 (SID_NAME=dg4ifmx3)
 (ORACLE_HOME=oracle_home_directory)
 (PROGRAM=dg4ifmx)
 )
)

where, oracle_home_directory is the directory where the gateway resides.
```

Multiple Informix Databases Example: Stopping and Starting the Oracle Net 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
```
Configure the Gateway to Access Multiple Informix Databases

Multiple Informix Databases Example: Configuring Oracle Database for Gateway Access

Configuring Oracle Net 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 Informix 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=port_number)
   (HOST=host_name))
  (CONNECT_DATA=
   (SID=dg4ifmx))
  (HS=OK))
new_db2_using=(DESCRIPTION=
  (ADDRESS=(PROTOCOL=TCP)
   (PORT=port_number)
   (HOST=host_name))
  (CONNECT_DATA=
   (SID=dg4ifmx2))
  (HS=OK))
new_db3_using=(DESCRIPTION=
  (ADDRESS=(PROTOCOL=TCP)
   (PORT=port_number)
   (HOST=host_name))
  (CONNECT_DATA=
   (SID=dg4ifmx3))
  (HS=OK))
```

The value for PORT is the TCP/IP port number of the Oracle Net Listener that is listening for the gateway. The number can be found in the listener.ora file used by the Oracle Net 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 Oracle Net Listener.

Multiple Informix Databases Example: Accessing Informix Data
Enter the following to create a database link for the dg4ifmx2 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK IFMX2 CONNECT TO
    2  "user2" IDENTIFIED BY "password2" USING 'new_db2_using';
```

Enter the following to create a database link for the dg4ifmx3 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK IFMX3 CONNECT TO
    2  "user3" IDENTIFIED BY "password3" USING 'new_db3_using';
```

After the database links are created, you can verify the connection to the new Informix databases, as in the following:

```
SQL> SELECT * FROM ALL_USERS@IFMX2;
```

```
SQL> SELECT * FROM ALL_USERS@IFMX3;
```
Part IV, "Installing and Configuring Oracle Database Gateway for Teradata" describes how to install and configure Oracle Database Gateway for Teradata on UNIX based platforms.

It contains the following chapters:

- Chapter 6, "Installing Oracle Database Gateway for Teradata"
- Chapter 7, "Configuring Oracle Database Gateway for Teradata"
Installing Oracle Database Gateway for Teradata

This chapter provides information about the hardware and software requirements and the installation procedure for Oracle Database Gateway for Teradata.

To install the gateway, follow these steps:

1. Ensure that the system meets all of the hardware and software requirements specified in "System Requirements for Oracle Database Gateway for Teradata" on page 6-1.

2. Run the Oracle Universal Installer.

   See "Step Through the Oracle Universal Installer" on page 6-4 for more information about running the Oracle Universal Installer.

   Oracle Universal Installer is a menu-driven utility that guides you through the installation of the gateway by prompting you with action items. The action items and the sequence in which they appear depend on your platform.

   See Table 6–3 for a description of the installation procedure of Oracle Database Gateway for Teradata

System Requirements for Oracle Database Gateway for Teradata

This section provides information about the hardware and software requirements for the gateway. It contains the following sections:

- "Hardware Requirements" on page 6-1
- "Software Requirements" on page 6-3

Hardware Requirements

Table 6–1 lists the minimum hardware requirements for Oracle Database Gateway for Teradata.

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Disk Space</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
</tr>
<tr>
<td>Disk Space</td>
<td>1.5 GB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>1.5 GB</td>
</tr>
<tr>
<td>Physical Memory</td>
<td>512 MB</td>
<td>512 MB</td>
<td>512 MB</td>
<td>512 MB</td>
</tr>
</tbody>
</table>
The minimum swap space is 1 GB (or twice the size of RAM). On systems with 2 GB or more of RAM, the swap space can be between one and two times the size of RAM. On AIX systems with 1 GB or more of memory, do not increase the swap space more than 2 GB.

Checking the Hardware Requirements

To ensure that the system meets the minimum requirements, follow these steps:

1. To determine the physical RAM size, enter one of the following commands:

   **Operating System** | **Command**
   --- | ---
   IBM AIX on POWER Systems (64-Bit) | # /usr/sbin/lsattr -E -l sys0 -a realmem
   Linux x86 64 bit | # grep MemTotal /proc/meminfo
   Oracle Solaris on SPARC (64-Bit) | # /usr/sbin/prtconf | grep "Memory size"
   HP-UX Itanium | # /usr/contrib/bin/machinfo | grep -i Memory

   If the size of the physical RAM installed in the system is less than the required size, you must install more memory before continuing.

2. To determine the size of the configured swap space, enter one of the following commands:

   **Operating System** | **Command**
   --- | ---
   IBM AIX on POWER Systems (64-Bit) | # /usr/sbin/lsps -a
   Linux x86 64 bit | # grep SwapTotal /proc/meminfo
   Oracle Solaris on SPARC (64-Bit) | # /usr/sbin/swap -s
   HP-UX Itanium | # /usr/sbin/swapinfo -a

   If necessary, see your operating system documentation for information about how to configure additional swap space.

3. To determine the amount of disk space available in the /tmp directory enter the following commands:

   **Operating System** | **Command**
   --- | ---
   IBM AIX on POWER Systems (64-Bit) | # df -k /tmp
   Linux x86 64 bit | # df -k /tmp
   Oracle Solaris on SPARC (64-Bit) | # df -k /tmp
4. To determine the amount of disk space available on the system enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP-UX Itanium</td>
<td># bdf /tmp</td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># df -k</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># df -k</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># df -k</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># bdf</td>
</tr>
</tbody>
</table>

Software Requirements

The following section describes the minimum software requirements for Oracle Database Gateway for Teradata.

Operating System

Table 6–2 lists the minimum operating system version required for Oracle Database Gateway for Teradata. If your operating system is lower than the minimum requirements, upgrade your operating system to meet the specified levels.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>AIX 5L version 5.3 TL9 or higher, AIX 6.1</td>
</tr>
<tr>
<td>Linux x86 64 bit Red Hat</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 6</td>
</tr>
<tr>
<td>Oracle Linux x86 64 bit</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 5 Update 5 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 6</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 6 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
<tr>
<td>Asianux Linux 64 bit</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Asianux Linux 2.0</td>
</tr>
<tr>
<td></td>
<td>■ Asianux Linux 3.0</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 64 bit</td>
<td>SUSE Linux Enterprise Server 10.0</td>
</tr>
<tr>
<td></td>
<td>SUSE Linux Enterprise Server 11.0</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td>Solaris 10, (Update 6 or later)</td>
</tr>
</tbody>
</table>
Checking the Software Requirements
To ensure that the system meets the minimum requirements, follow these steps:

- To determine which version of IBM AIX on POWER Systems (64-Bit) is installed, enter the following command:
  
  # oslevel -r

- To determine which distribution and version of Linux x86 64 bit is installed, enter the following command:
  
  # cat /proc/version

- To determine which version of Oracle Solaris on SPARC (64-Bit) is installed, enter the following command:
  
  # uname -r

- To determine which version of HP-UX Itanium is installed, enter the following command:
  
  # uname -a

Certified Configuration
Teradata client libraries are required on the machine where the gateway is installed. For the latest certified clients refer to the OTN Web site:


Step Through the Oracle Universal Installer

Table 6–3 describes the installation procedure for Oracle Database Gateway for Teradata.
Table 6–3  The Oracle Universal Installer: Steps for Installing the Gateway

<table>
<thead>
<tr>
<th>Screen</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Universal Installer: Welcome</td>
<td>Click Next.</td>
</tr>
<tr>
<td>Oracle Universal Installer: File Locations</td>
<td>The Source section of the screen is where you specify the source location that the Oracle Universal Installer must use to install the Oracle Database Gateway for Teradata. You need not edit the file specification in the Path field. The default setting for this field points to the installer file on your Oracle Database Gateway installation media. The Path field in the Destination section of the File Locations screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the File Locations screen as necessary, click Next to continue. After loading the necessary information from the installation media, the Oracle Universal Installer displays the Available Products screen.</td>
</tr>
<tr>
<td>Product Components</td>
<td>b. Click Next.</td>
</tr>
<tr>
<td>Oracle Database Gateway for Teradata</td>
<td>Teradata Database Server Host IP or Alias - Specify the host name or the IP address of the machine hosting the Teradata database server. This release supports IPv6 format. Teradata Database Server Port number - Specify the port number of the Teradata database server Teradata Database Name - Specify the Teradata database name Teradata TD_ICU_DATA Path - Specify the local path where ICU data libraries are located (Typically /opt/teradata/tdicu/lib or what $TD_ICU_DATA is set to in /etc/profile). Teradata COPLIB Path – Specify the local path were COPLIB is located (Typically /usr/lib or what $COPLIB is set to in /etc/profile). Teradata COPERR Path – Specify the local path were COPERR is located (Typically /usr/lib or what $COPERR is set to in /etc/profile). Click Next to continue.</td>
</tr>
<tr>
<td>Oracle Universal Installer: Summary</td>
<td>The Installation Summary screen enables you to review a tree list of options and components for this installation. Click Install to start installation.</td>
</tr>
<tr>
<td>Oracle Net Configuration Assistant: Welcome</td>
<td>Click Cancel</td>
</tr>
<tr>
<td>Oracle Net Configuration Assistant:</td>
<td>Click Yes</td>
</tr>
<tr>
<td>Oracle Universal Installer: Configuration</td>
<td>Click Exit</td>
</tr>
<tr>
<td>Tools</td>
<td></td>
</tr>
</tbody>
</table>

Exit  The final screen of the Oracle Universal Installer is the End of Installation screen. Click Exit to exit the installer.
Configuring Oracle Database Gateway for Teradata

After installing the gateway, perform the following tasks to configure Oracle Database Gateway for Teradata:

1. Configure the Gateway Initialization Parameter File
2. Configure Oracle Net for the Gateway
3. Configure the Oracle Database for Gateway Access
4. Create Database Links
5. Configure Two-Phase Commit
6. Encrypt Gateway Initialization Parameter Values
7. Configure the Gateway to Access Multiple Teradata Databases

Configure the Gateway Initialization Parameter File

Perform the following tasks to configure the gateway initialization parameter file:

1. Choose a System Identifier for the Gateway
2. Customize the Initialization Parameter File

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 Teradata database you are accessing. The SID is used as part of the file name for the initialization parameter file. The default SID is **dg4tera**.

You can define a gateway SID, but using the default of **dg4tera** is easier because you do not need to change the initialization parameter file name. However, if you want to access two Teradata databases, you need two gateway SIDs, one for each instance of the gateway. If you have only one Teradata database and want to access it sometimes with one set of gateway parameter settings, and other times with different gateway parameter settings, then you will need multiple gateway SIDs for the single Teradata database.

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:
Configure Oracle Net for the Gateway

$ORACLE_HOME/dg4tera/admin/initdg4tera.ora

Where $ORACLE_HOME is the directory under which the gateway is installed.

This initialization file is for the default gateway SID. If you are not using dg4tera as the gateway SID, you must rename the initialization parameter file using the SID you chose in the preceding step "Choose a System Identifier for the Gateway" on page 7-1. This default initialization parameter file is sufficient for starting the gateway, verifying a successful installation, and running the demonstration scripts.

A number of initialization parameters can be used to modify the gateway behavior. Refer to Appendix C, "Initialization Parameters" for the complete list of initialization parameters that can be set. Changes made to the initialization parameters only take effect in the next gateway session. The most important parameter is the HS_FDS_CONNECT_INFO, which describes the connection to the non-Oracle system.

The default initialization parameter file already has an entry for this parameter. The syntax for HS_FDS_CONNECT_INFO is as follows:

```
HS_FDS_CONNECT_INFO=host_alias:port_number[/database_name]
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_alias</td>
<td>is the host alias name or IP address of the machine hosting the Teradata database.</td>
</tr>
<tr>
<td>port_number</td>
<td>is the port number of the Teradata database server.</td>
</tr>
<tr>
<td>database_name</td>
<td>is the Teradata database name.</td>
</tr>
</tbody>
</table>

This release of gateway can support IPv6. If IPv6 address format is to be specified, you have to wrap it with square brackets to indicate the separation from the port number. For example,

```
HS_FDS_CONNECT_INFO=[2001:0db8:20C:F1FF:FEC6:38AF]:1300/my_db
```

See Also: Appendix C, "Initialization Parameters" and the Oracle Database Heterogeneous Connectivity Administrator's Guide for more information about customizing the initialization parameter file.

Configure Oracle Net for the Gateway

The gateway requires Oracle Net to communicate with the Oracle database. After configuring the gateway, perform the following tasks to configure Oracle Net to work with the gateway:

1. Configure Oracle Net Listener for the Gateway
2. Stop and Start the Oracle Net Listener for the Gateway

Configure Oracle Net Listener for the Gateway

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

- A list of Oracle Net addresses on which the Oracle Net Listener listens.
- The executable name of the gateway that the Oracle Net Listener starts in response to incoming connection requests.

A sample of the `listener.ora` entry (`listener.ora.sample`) is available in the `$ORACLE_HOME/dg4tera/admin` directory where `$ORACLE_HOME` is the directory under which the gateway is installed.

**Syntax of listener.ora File Entries**

The Oracle database communicates with the gateway using Oracle Net and any supported protocol adapters. The following is the syntax of the address on which the Oracle Net Listener listens using the TCP/IP protocol adapter:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>host_name</code></td>
<td>is the name of the machine on which the gateway is installed. IPv6 format is supported with this release. Refer to Oracle Database Net Services Reference for detail.</td>
</tr>
<tr>
<td><code>port_number</code></td>
<td>specifies the port number used by the Oracle Net Listener. If you have other listeners running on the same machine, then the value of <code>port_number</code> must be different from the other listeners’ port numbers.</td>
</tr>
</tbody>
</table>

To direct the Oracle Net Listener to start the gateway in response to incoming connection requests, add an entry to the `listener.ora` file.

**Note:** You must use the same SID value in the listener.ora file and the `tnsnames.ora` file that will be configured in the next step.

For Solaris SPARC and Linux x86 64bit:

```
SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=oracle_home_directory)
      (PROGRAM=dg4tera)
      (ENVS=LD_LIBRARY_PATH=teradata_client_library_directory:oracle_home_directory/lib:/usr/lib))
  }
```

For AIX:

```
SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=
```
Configure Oracle Net for the Gateway

```plaintext
(SID_NAME=gateway_sid)
(ORACLE_HOME=oracle_home_directory)
(PROGRAM=dg4tera)
(ENVS=LIBPATH=teradata_client_library_directory:oracle_home_directory/lib:/usr/lib/lib_64)
)
)
)
)

For HP-UX Itanium:

SID_LIST_LISTENER=
(SID_LIST=
(SID_DESC=
(SID_NAME=gateway_sid)
(ORACLE_HOME=oracle_home_directory)
(PROGRAM=dg4tera)
(ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4tera/driver/lib:oracle_home_directory/lib:teradata_client_library_directory:/usr/lib/hpux64)
)
)
)

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway. Matches the gateway SID specified in the connect descriptor entry in the tnsnames.ora file.</td>
</tr>
<tr>
<td>oracle_home_directory</td>
<td>specifies the Oracle home directory where the gateway resides.</td>
</tr>
<tr>
<td>teradata_client_library_directory</td>
<td>specifies the directory where the Teradata client directory resides.</td>
</tr>
<tr>
<td>dg4tera</td>
<td>specifies the executable name of the Oracle Database Gateway for Teradata.</td>
</tr>
</tbody>
</table>

If you already have an existing Oracle Net Listener, then add the following syntax to SID_LIST in the existing listener.ora file. Note the syntax provided below is for HP-UX Itanium. Refer to the above section for other platforms.

For HP-UX Itanium:

SID_LIST_LISTENER=
(SID_LIST=
(SID_DESC=.
  .
)
(SID_DESC=.
)
(SID_DESC=.
(SID_NAME=gateway_sid)
(ORACLE_HOME=oracle_home_directory)
(ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4sybs/driver/lib:oracle_home_directory/lib)
(PROGRAM=dg4sybs)
)
)

See Also: Oracle Net Services Administrator’s Guide for information about changing the listener.ora file.
Stop and Start the Oracle Net Listener for the Gateway

You must stop and restart the Oracle Net Listener to initiate the new settings, as follows:

1. Set the PATH environment variable to $ORACLE_HOME/bin where $ORACLE_HOME is the directory in which the gateway is installed.

   For example on the Linux platform, if you have the Bourne or Korn Shell, enter the following:

   ```
   $ PATH=$ORACLE_HOME/bin:$PATH;export PATH
   $ LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH
   ```

   If you have the C Shell, enter the following:

   ```
   $ setenv PATH $ORACLE_HOME/bin:$PATH
   $ setenv LD_LIBRARY_PATH $ORACLE_HOME/lib:$LD_LIBRARY_PATH
   ```

   Table 7–1 specifies which parameter value to use for the different platforms:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris (SPARC) 64 bit</td>
<td>LD_LIBRARY_PATH_64=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>LIBPATH=$ORACLE_HOME/lib</td>
</tr>
</tbody>
</table>

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 a partial output from a lsnrctl status check:

   ```
   Services Summary...
   Service 'dg4tera' has 1 instance(s).
   Instance 'dg4tera', status UNKNOWN, has 1 handler(s) for this service...
   The command completed successfully
   ```

   In this example, the service name is dg4tera, which is the default SID value assigned during installation.

Configure the Oracle Database for Gateway Access

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

To configure the Oracle database you must add connect descriptors to the tnsnames.ora file. By default, this file is in $ORACLE_HOME/network/admin, where
$ORACLE_HOME is the directory in which the Oracle database is installed. You cannot use the Oracle Net Assistant or the Oracle Net Easy Config tools to configure the tnsnames.ora file. You must edit the file manually.

A sample of the tnsnames.ora entry (tnsnames.ora.sample) is available in the $ORACLE_HOME/dg4tera/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

**Configuring tnsnames.ora**

Edit the tnsnames.ora file to add a connect descriptor for the gateway. The following is the syntax of the Oracle Net entry using the TCP/IP protocol:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>connect_descriptor</code></td>
<td>is the description of the object to connect to as specified when creating the database link, such as dg4tera. Check the sqlnet.ora file for the following parameter setting: names.directory_path = (TNSNAMES)</td>
</tr>
<tr>
<td><code>TCP</code></td>
<td>is the TCP protocol used for TCP/IP connections.</td>
</tr>
<tr>
<td><code>host_name</code></td>
<td>specifies the machine where the gateway is running.</td>
</tr>
<tr>
<td><code>port_number</code></td>
<td>matches the port number used by the Oracle Net Listener that is listening for the gateway. The Oracle Net Listener’s port number can be found in the listener.ora file used by the Oracle Net Listener. See &quot;Syntax of listener.ora File Entries&quot; on page 7-3.</td>
</tr>
<tr>
<td><code>gateway_sid</code></td>
<td>specifies the SID of the gateway and matches the SID specified in the listener.ora file of the Oracle Net Listener that is listening for the gateway. See &quot;Configure Oracle Net Listener for the Gateway&quot; on page 7-2 for more information.</td>
</tr>
<tr>
<td><code>(HS=OK)</code></td>
<td>specifies that this connect descriptor connects to a non-Oracle system.</td>
</tr>
</tbody>
</table>

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

**Configuring tnsnames.ora for Multiple Listeners**

To ensure higher availability, you can specify multiple listeners within the connect descriptor.
connect_descriptor =
   (DESCRIPTION =
      (ADDRESS =
        (PROTOCOL = TCP)
        (HOST = host_name_1)
        (PORT = port_number_1)
      )
      (ADDRESS =
        (PROTOCOL = TCP)
        (HOST = host_name_2)
        (PORT = port_number_2)
      )
      (CONNECT_DATA =
        (SID = gateway_sid)
        (HS = OK)
      )
   )

This indicates that, if the listener for host_name_1 and port_number_1 is not available, then the second listener for host_name_2 and port_number_2 will take over.

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

Create Database Links

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

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 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 Teradata 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.

To access the Teradata server, you must create a database link. A public database link is the most common of database links.

```sql
SQL> CREATE PUBLIC DATABASE LINK dblink CONNECT TO user IDENTIFIED BY "password" USING 'tns_name_entry';
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dblink</td>
<td>is the complete database link name.</td>
</tr>
<tr>
<td>tns_name_entry</td>
<td>specifies the Oracle Net connect descriptor specified in the tnsnames.ora file that identifies the gateway</td>
</tr>
</tbody>
</table>

After the database link is created you can verify the connection to the Teradata database, as follows:

```sql
SQL> SELECT * FROM DUAL@dblink;
```
See Also: Oracle Database Administrator’s Guide and Oracle Database Heterogeneous Connectivity User’s Guide for more information about using database links.

Configure Two-Phase Commit

The gateway supports the following transaction capabilities:

- COMMIT_CONFIRM
- READ_ONLY
- SINGLE_SITE

The transaction model is set using the HS_TRANSACTION_MODEL initialization parameter. By default, the gateway runs in COMMIT_CONFIRM transaction mode. When the Teradata database is updated by a transaction, the gateway becomes the commit point site. The Oracle database commits the unit of work in the Teradata database after verifying that all Oracle databases in the transaction have successfully prepared the transaction. Only one gateway instance can participate in an Oracle two-phase commit transaction as the commit point site.

See Also: Oracle Database Heterogeneous Connectivity User’s Guide for information about the two-phase commit process.

To enable the COMMIT_CONFIRM transaction mode, perform the following tasks:

1. Create a Recovery Account and Password
2. Create the Transaction Log Table

The log table, called HS_TRANSACTION_LOG, is where two-phase commit transactions are recorded. Alternatively, users can specify a different table name by setting a gateway initialization parameter HS_FDS_TRANSACTION_LOG parameter. This table needs to be in the same schema as the recovery account.

Create a Recovery Account and Password

For the gateway to recover distributed transactions, a recovery account and password must be set up in the Teradata 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 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 dg4pwd that should be used for encryption. Refer to Section 4.2.3, ‘Encrypting Initialization parameters’ in the Oracle Database Heterogeneous Connectivity User’s Guide for further details.

1. Set up a user account in the Teradata database. Both the user name and password must be a valid Teradata user name and password.
2. In the initialization parameter file, set the following gateway initialization parameters:
Encrypt Gateway Initialization Parameter Values

- **HS_FDS_RECOVERY_ACCOUNT** to the user name of the Teradata user account you set up for recovery.
- **HS_FDS_RECOVERY_PWD** to the password of the Teradata user account you set up for recovery.

**See Also:** "Customize the Initialization Parameter File" on page 7-1 for information about editing the initialization parameter file. For information about **HS_FDS_RECOVERY_ACCOUNT** and **HS_FDS_RECOVERY_PWD**, see Appendix C, "Initialization Parameters".

Create the Transaction Log Table

When configuring the gateway for two-phase commit, a table must be created in the Teradata database for logging transactions. The gateway uses the transaction log table to check the status of failed transactions that were started at the Teradata 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)** 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 C, "Initialization Parameters" for information about the **HS_FDS_TRANSACTION_LOG** initialization parameter.

Create the transaction log table in the user account you created in "Create a Recovery Account and Password" on page 7-8. Because the transaction log table is used to record the status of a gateway transaction, the table must reside at the database where the Teradata 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 **dg4tera_tx.sql** script, located in the directory $ORACLE_HOME/dg4tera/admin, where $ORACLE_HOME is the directory under which the gateway is installed.

Encrypt Gateway Initialization Parameter Values

The gateway uses user IDs and passwords to access the information in the remote database. Some user IDs and passwords must be defined in the gateway initialization file to handle functions such as resource recovery. In the current security conscious
Configure the Gateway to Access Multiple Teradata Databases

The tasks for configuring the gateway to access multiple Teradata 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 dg4tera.
- The ORACLE_HOME environment variable is set to the directory where the gateway is installed.
- The gateway is configured for one Teradata database named db1.
- Two Teradata databases named db2 and db3 on a host with IP Address 204.179.79.15 are being added.

Multiple Teradata Databases Example: Configuring the Gateway

Choose One System ID for Each Teradata Database
A separate instance of the gateway is needed for each Teradata database. Each instance needs its own gateway System ID (SID). For this example, the gateway SIDs are chosen for the instances that access the Teradata databases:

- dg4tera2 for the gateway accessing database db2.
- dg4tera3 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/dg4tera/admin/initdg4tera.ora, twice, naming one with the gateway SID for db2 and the other with the gateway SID for db3:

$ cd $ORACLE_HOME/dg4tera/admin
$ cp initdg4tera.ora initdg4tera2.ora
$ cp initdg4tera.ora initdg4tera3.ora

Change the value of the HS_FDS_CONNECT_INFO parameter in the new files.

For initdg4tera2.ora, enter the following:

HS_FDS_CONNECT_INFO=204.179.79.15:1025/db2

For initdg4tera3.ora, enter the following:

HS_FDS_CONNECT_INFO=204.179.79.15:1025/db3
Configure the Gateway to Access Multiple Teradata Databases

Configuring Oracle Database Gateway for Teradata

Multiple Teradata Databases Example: Configuring Oracle Net Listener

Add Entries to listener.ora
Add two new entries to the Oracle Net 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=dg4tera)
    {ORACLE_HOME=oracle_home_directory}
    {PROGRAM=dg4tera}
  }
  {ENVS=LD_LIBRARY_PATH=oracle_home_directory/lib:teradata_client_library_directory:/usr/lib}
  }
  {SID_DESC=
   {SID_NAME=dg4tera2)
    {ORACLE_HOME=oracle_home_directory}
    {PROGRAM=dg4tera}
  }
  {ENVS=LD_LIBRARY_PATH=oracle_home_directory/lib:teradata_client_library_directory:/usr/lib}
  }
  {SID_DESC=
   {SID_NAME=dg4tera3)
    {ORACLE_HOME=oracle_home_directory}
    {PROGRAM=dg4tera}
  }
  {ENVS=LD_LIBRARY_PATH=oracle_home_directory/lib:teradata_client_library_directory:/usr/lib}
  }
}
```

where, oracle_home_directory is the directory where the gateway resides.

Multiple Teradata Databases Example: Stopping and Starting the Oracle Net 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 Teradata Databases Example: Configuring Oracle Database for Gateway Access

Configuring Oracle Net 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 Teradata 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=port_number)
        (HOST=host_name))
    (CONNECT_DATA=
        (SID=dg4tera))
    (HS=OK))
new_db2_using=(DESCRIPTION=
    (ADDRESS=
        (PROTOCOL=TCP)
        (PORT=port_number)
        (HOST=host_name))
    (CONNECT_DATA=
        (SID=dg4tera2))
    (HS=OK))
new_db3_using=(DESCRIPTION=
    (ADDRESS=
        (PROTOCOL=TCP)
        (PORT=port_number)
        (HOST=host_name))
    (CONNECT_DATA=
        (SID=dg4tera3))
    (HS=OK))
```

The value for PORT is the TCP/IP port number of the Oracle Net Listener that is listening for the gateway. The number can be found in the listener.ora file used by the Oracle Net 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 Oracle Net Listener.

Multiple Teradata Databases Example: Accessing Teradata Data
Enter the following to create a database link for the dg4tera2 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK TERA2 CONNECT TO
    2 "user2" IDENTIFIED BY 'password2' USING 'new_db2_using';
```

Enter the following to create a database link for the dg4tera3 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK TERA3 CONNECT TO
    2 "user3" IDENTIFIED BY 'password3' USING 'new_db3_using';
```

After the database links are created, you can verify the connection to the new Teradata databases, as in the following:

```
SQL> SELECT * FROM ALL_USERS@TERA2;
```
SQL> SELECT * FROM ALL_USERS@TERA3;
Part V, "Installing and Configuring Oracle Database Gateway for SQL Server" describes how to install and configure Oracle Database Gateway for SQL Server on UNIX based platforms.

It contains the following chapters:

- Chapter 8, "Installing Oracle Database Gateway for SQL Server"
- Chapter 9, "Configuring Oracle Database Gateway for SQL Server"
Installing Oracle Database Gateway for SQL Server

This chapter provides information about the hardware and software requirements and the installation procedure for Oracle Database Gateway for Microsoft SQL Server.

To install the gateway, follow these steps:

1. Ensure that the system meets all of the hardware and software requirements specified in "System Requirements for Oracle Database Gateway for SQL Server" on page 8-1.

2. Run the Oracle Universal Installer.

   See "Step Through the Oracle Universal Installer" on page 8-4 for more information about running the Oracle Universal Installer.

   Oracle Universal Installer is a menu-driven utility that guides you through the installation of the gateway by prompting you with action items. The action items and the sequence in which they appear depend on your platform.

   See Table 8–3 for a description of the installation procedure of Oracle Database Gateway for SQL Server.

System Requirements for Oracle Database Gateway for SQL Server

This section provides information about the hardware and software requirements for the gateway. It contains the following sections:

- "Hardware Requirements" on page 8-1
- "Software Requirements" on page 8-3

Hardware Requirements

Table 8–1 lists the minimum hardware requirements for Oracle Database Gateway for SQL Server.

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for Oracle Solaris on x86-64 (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Disk Space</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
</tr>
<tr>
<td>Disk Space</td>
<td>1.5 GB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>1.5 GB</td>
</tr>
</tbody>
</table>
The minimum swap space is 1 GB (or twice the size of RAM). On systems with 2 GB or more of RAM, the swap space can be between one and two times the size of RAM. On AIX systems with 1 GB or more of memory, do not increase the swap space more than 2 GB.

Checking the Hardware Requirements

To ensure that the system meets the minimum requirements, follow these steps:

1. To determine the physical RAM size, enter one of the following commands:

   **Operating System** | **Command**
   --- | ---
   IBM AIX on POWER Systems (64-Bit) | `#/usr/sbin/lsattr -E -l sys0 -a realmem`
   Linux x86 64 bit | `# grep MemTotal /proc/meminfo`
   Oracle Solaris on SPARC (64-Bit) | `#/usr/sbin/prtconf | grep 'Memory size'`
   Oracle Solaris on x86-64 (64-Bit) | `#/usr/sbin/prtconf | grep 'Memory size'`
   HP-UX Itanium | `#/usr/contrib/bin/machinfo | grep -i Memory`

   If the size of the physical RAM installed in the system is less than the required size, you must install more memory before continuing.

2. To determine the size of the configured swap space, enter one of the following commands:

   **Operating System** | **Command**
   --- | ---
   IBM AIX on POWER Systems (64-Bit) | `#/usr/sbin/lsps -a`
   Linux x86 64 bit | `# grep SwapTotal /proc/meminfo`
   Oracle Solaris on SPARC (64-Bit) | `#/usr/sbin/swap -s`
   Oracle Solaris on x86-64 (64-Bit) | `#/usr/sbin/swap -s`
   HP-UX Itanium | `#/usr/sbin/swapinfo -a`

   If necessary, see your operating system documentation for information about how to configure additional swap space.

3. To determine the amount of disk space available in the `/tmp` directory enter the following commands:
System Requirements for Oracle Database Gateway for SQL Server

4. To determine the amount of disk space available on the system enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># bdf /tmp</td>
</tr>
</tbody>
</table>

Software Requirements

The following section describes the minimum software requirements for Oracle Database Gateway for SQL Server.

Operating System

Table 8–2 shows the minimum operating system version required for Oracle Database Gateway for SQL Server. If your operating system is lower than the minimum requirements, upgrade your operating system to meet the specified levels.

Table 8–2  Operating Systems Version for Oracle Database Gateway for SQL Server

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>AIX 5L version 5.3 TL9 or higher, AIX 6.1</td>
</tr>
</tbody>
</table>
| Linux x86 64 bit Red Hat | One of the following operating system versions:  
  ■ Red Hat Enterprise Linux 4.0, (Update 7 or later)  
  ■ Red Hat Enterprise Linux 5 Update 2  
  ■ Red Hat Enterprise Linux 6 |
| Oracle Linux x86 64 bit | One of the following operating system versions:  
  ■ Oracle Linux 4.0, (Update 7 or later)  
  ■ Oracle Linux 5 Update 2  
  ■ Oracle Linux 5 Update 5 (with the Oracle Unbreakable Enterprise Kernel for Linux)  
  ■ Oracle Linux 6  
  ■ Oracle Linux 6 (with the Oracle Unbreakable Enterprise Kernel for Linux) |
Checking the Software Requirements

To ensure that the system meets the minimum requirements, follow these steps:

- To determine which version of IBM AIX on POWER Systems (64-Bit) is installed, enter the following command:
  ```
  # oslevel -r
  ```

- To determine which distribution and version of Linux x86 64 bit is installed, enter the following command:
  ```
  # cat /proc/version
  ```

- To determine which version of Oracle Solaris on SPARC (64-Bit) is installed, enter the following command:
  ```
  # uname -r
  ```

- To determine which version of Oracle Solaris on x86-64 (64-Bit) is installed, enter the following command:
  ```
  # uname -r
  ```

- To determine which version of HP-UX Itanium is installed, enter the following command:
  ```
  # uname -a
  ```

Certified Configuration

The gateway supports SQL Server. For the latest versions supported refer to the OTN Web site:


Step Through the Oracle Universal Installer

Table 8–3 describes the installation procedure for Oracle Database Gateway for SQL Server
### Table 8–3  The Oracle Universal Installer: Steps for Installing the Gateway

<table>
<thead>
<tr>
<th>Screen</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Universal Installer: Welcome</td>
<td>Click Next.</td>
</tr>
<tr>
<td>Oracle Universal Installer: Specify Home Details</td>
<td>Specify a name for the installation in the Name field. You can also choose not to edit the default setting of the Name field of the Specify Home Details screen. The Path field in the Specify Home Details screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the Specify Home Details screen as necessary, click Next to continue. After loading the necessary information from the installation media, the Oracle Universal Installer displays the Available Products screen.</td>
</tr>
<tr>
<td>Oracle Universal Installer: Available Product Components</td>
<td>a. Select <strong>Oracle Database Gateway for SQL Server 12.1</strong>. &lt;br&gt;b. Click Next.</td>
</tr>
<tr>
<td>Oracle Database Gateway for SQL Server</td>
<td><strong>SQL Server Database Server Host Name</strong> - Specify the host name or the IP address of the machine hosting the SQL Server database server. This release supports IPv6 format. &lt;br&gt;<strong>SQL Server Database Server Port number</strong> - Specify the port number of the SQL Server database server &lt;br&gt;<strong>SQL Server Database Name</strong> - Specify the SQL Server database name &lt;br&gt;Click Next to continue.</td>
</tr>
<tr>
<td>Oracle Universal Installer: Summary</td>
<td>The Installation Summary screen enables you to review a tree list of options and components for this installation. Click Install to start installation.</td>
</tr>
<tr>
<td>Oracle Net Configuration Assistant: Welcome</td>
<td>Click Cancel.</td>
</tr>
<tr>
<td>Oracle Net Configuration Assistant: Configuration Tools</td>
<td>Click Yes.</td>
</tr>
<tr>
<td>Oracle Universal Installer: Configuration Tools</td>
<td>Click Exit.</td>
</tr>
<tr>
<td>Exit</td>
<td>The final screen of the Oracle Universal Installer is the End of Installation screen. Click Exit to exit the installer.</td>
</tr>
</tbody>
</table>
Configuring Oracle Database Gateway for SQL Server

After installing the gateway, perform the following tasks to configure Oracle Database Gateway for SQL Server:

1. Configure the Gateway Initialization Parameter File
2. Configure Oracle Net for the Gateway
3. Configure the Oracle Database for Gateway Access
4. Create Database Links
5. Configure Two-Phase Commit
6. Create SQL Server Views for Data Dictionary Support
7. Encrypt Gateway Initialization Parameter Values
8. Configure the Gateway to Access Multiple SQL Server Databases

Configure the Gateway Initialization Parameter File

Perform the following tasks to configure the gateway initialization parameter file.

1. Choose a System Identifier for the Gateway
2. Customize the Initialization Parameter File

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 SQL Server database you are accessing. The SID is used as part of the file name for the initialization parameter file. The default SID is dg4msql.

You can define a gateway SID, but using the default of dg4msql is easier because you do not need to change the initialization parameter file name. However, if you want to access two SQL Server databases, you need two gateway SIDs, one for each instance of the gateway. If you have only one SQL Server database and want to access it sometimes with one set of gateway parameter settings, and other times with different gateway parameter settings, then you will need multiple gateway SIDs for the single SQL Server database.
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/dg4msql/admin/initdg4msql.ora

Where $ORACLE_HOME is the directory under which the gateway is installed.

This initialization file is for the default gateway SID. If you are not using dg4msql as the gateway SID, you must rename the initialization parameter file using the SID you chose in the preceding step "Choose a System Identifier for the Gateway" on page 9-1. This default initialization parameter file is sufficient for starting the gateway, verifying a successful installation, and running the demonstration scripts.

A number of initialization parameters can be used to modify the gateway behavior. Refer to Appendix C, "Initialization Parameters" for the complete list of initialization parameters that can be set. Changes made to the initialization parameters only take effect in the next gateway session. The most important parameter is the HS_FDS_CONNECT_INFO, which describes the connection to the non-Oracle system.

The default initialization parameter file already has an entry for this parameter. The syntax for HS_FDS_CONNECT_INFO is as follows:

\[\text{HS_FDS\_CONNECT\_INFO=host\_name[[:port\_number]][:instance\_name]/database\_name}\]

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_name</td>
<td>is the host name or IP address of the machine hosting the SQL Server database.</td>
</tr>
<tr>
<td>port_number</td>
<td>is the port number of the SQL Server database.</td>
</tr>
<tr>
<td>instance_name</td>
<td>is the instance of SQL Server running on the machine.</td>
</tr>
<tr>
<td>database_name</td>
<td>is the SQL Server Database database name.</td>
</tr>
</tbody>
</table>

Either of the variables port_number or instance_name can be used, but not both together. Optionally, they both can be omitted. The variable database_name is always optional. The slash (/) is required when a particular value is omitted. For example, all of the following entries are valid:

\[\begin{align*}
\text{HS\_FDS\_CONNECT\_INFO=host\_name/instance\_name/database\_name} \\
\text{HS\_FDS\_CONNECT\_INFO=host\_name/database\_name} \\
\text{HS\_FDS\_CONNECT\_INFO=host\_name:port\_name/database\_name} \\
\text{HS\_FDS\_CONNECT\_INFO=host\_name/instance\_name} \\
\text{HS\_FDS\_CONNECT\_INFO=host\_name} \\
\end{align*}\]

This release of gateway can support IPv6. If IPv6 address format is to be specified, you have to wrap it with square brackets to indicate the separation from the port number. For example,

\[\text{HS\_FDS\_CONNECT\_INFO=[2001:0db8:20C:FF00:0000:0000:0000:0000]:1300//SQL\_DB1}\]

See Also: Appendix C, "Initialization Parameters" and the Oracle Database Heterogeneous Connectivity User's Guide for more information about customizing the initialization parameter file.
Configure Oracle Net for the Gateway

The gateway requires Oracle Net to communicate with the Oracle database. After configuring the gateway, perform the following tasks to configure Oracle Net to work with the gateway:

1. Configure Oracle Net Listener for the Gateway
2. Stop and Start the Oracle Net Listener for the Gateway

Configure Oracle Net Listener for the Gateway

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

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

- A list of Oracle Net addresses on which the Oracle Net Listener listens
- The executable name of the gateway that the Oracle Net Listener starts in response to incoming connection requests

A sample of the listener.ora entry (listener.ora.sample) is available in the $ORACLE_HOME/dg4msql/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

Syntax of listener.ora File Entries

The Oracle database communicates with the gateway using Oracle Net and any supported protocol adapters. The following is the syntax of the address on which the Oracle Net Listener listens using the TCP/IP protocol adapter:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>host_name</td>
<td>is the name of the machine on which the gateway is installed. IPv6 format is supported with this release. Refer to Oracle Database Net Services Reference for detail.</td>
</tr>
<tr>
<td>port_number</td>
<td>specifies the port number used by the Oracle Net Listener. If you have other listeners running on the same machine, then the value of port_number must be different from the other listeners’ port numbers.</td>
</tr>
</tbody>
</table>

To direct the Oracle Net Listener to start the gateway in response to incoming connection requests, add an entry to the listener.ora file.

**Note:** You must use the same SID value in the listener.ora file and the tnsnames.ora file that will be configured in the next step.
Configure Oracle Net for the Gateway

For AIX, Solaris SPARC, and Linux:

```plaintext
SID_LIST_LISTENER=
 (SID_LIST=
  (SID_DESC=
   (SID_NAME=gateway_sid)
   (ORACLE_HOME=oracle_home_directory)
   (PROGRAM=dg4msql)
  )
 )
```

For HP-UX Itanium:

```plaintext
SID_LIST_LISTENER=
 (SID_LIST=
  (SID_DESC=
   (SID_NAME=gateway_sid)
   (ORACLE_HOME=oracle_home_directory)
   (ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4msql/driver/lib:oracle_home_directory/lib)
   (PROGRAM=dg4msql)
  )
 )
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the tnsnames.ora file.</td>
</tr>
<tr>
<td>oracle_home_directory</td>
<td>specifies the Oracle home directory where the gateway resides.</td>
</tr>
<tr>
<td>dg4msql</td>
<td>specifies the executable name of the Oracle Database Gateway for SQL Server.</td>
</tr>
</tbody>
</table>

If you already have an existing Oracle Net Listener, then add the following syntax to SID_LIST in the existing listener.ora file:

For AIX, Solaris SPARC, and Linux:

```plaintext
SID_LIST_LISTENER=
 (SID_LIST=
  (SID_DESC=
   (SID_NAME=gateway_sid)
   (ORACLE_HOME=oracle_home_directory)
   (PROGRAM=dg4msql)
  )
 )
```

For HP-UX Itanium:

```plaintext
SID_LIST_LISTENER=
 (SID_LIST=
  (SID_DESC=.
   (SID_NAME=gateway_sid)
   (ORACLE_HOME=oracle_home_directory)
   (PROGRAM=dg4msql)
  )
 )
```
Configure Oracle Net for the Gateway

Configuring Oracle Database Gateway for SQL Server

```
{SID_DESC=.
 {SID_DESC=
 {SID_NAME=gateway_sid}
 {ORACLE_HOME=oracle_home_directory}
 {ENVS=LD_LIBRARY_PATH=oracle_home_directory/dg4msql/driver/lib:oracle_home_directory/lib}
 {PROGRAM=dg4msql}
 }
}
```

See Also: Oracle Net Administrator’s Guide for information about changing the listener.ora file.

Stop and Start the Oracle Net Listener for the Gateway

You must stop and restart the Oracle Net Listener to initiate the new settings, as follows:

1. Set the PATH environment variable to \$ORACLE_HOME/bin where \$ORACLE_HOME is the directory in which the gateway is installed.
   
   For example on the Linux platform, if you have the Bourne or Korn Shell, enter the following:
   
   ```
   $ PATH=$ORACLE_HOME/bin:$PATH;export PATH
   $ LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH
   ```

   If you have the C Shell, enter the following:
   
   ```
   $ setenv PATH $ORACLE_HOME/bin:$PATH
   $ setenv LD_LIBRARY_PATH $ORACLE_HOME/lib:$LD_LIBRARY_PATH
   ```

   Table 9–1 specifies which parameter value to use for the different platforms:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris (SPARC) 64 bit and Oracle Solaris on x86-64 (64-Bit)</td>
<td>LD_LIBRARY_PATH_64=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>LIBPATH=$ORACLE_HOME/lib</td>
</tr>
</tbody>
</table>

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 a partial output from a lsnrctl status check:
Configure the Oracle Database for Gateway Access

Before you use the gateway to access SQL Server data you must configure the Oracle database to enable communication with the gateway over Oracle Net.

To configure the Oracle database you must add connect descriptors to the tnsnames.ora file. By default, this file is in $ORACLE_HOME/network/admin, where $ORACLE_HOME is the directory in which the Oracle database is installed. You cannot use the Oracle Net Assistant or the Oracle Net Easy Config tools to configure the tnsnames.ora file. You must edit the file manually.

A sample of the tnsnames.ora entry (tnsnames.ora.sample) is available in the $ORACLE_HOME/dg4msql/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

Configuring tnsnames.ora

Edit the tnsnames.ora file to add a connect descriptor for the gateway. The following is the syntax of the Oracle Net entry using the TCP/IP protocol:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect_descriptor</td>
<td>is the description of the object to connect to as specified when creating the database link, such as dg4msql. Check the sqlnet.ora file for the following parameter setting: names.directory_path = (TNSNAMES) Note: The sqlnet.ora file is typically stored in $ORACLE_HOME/network/admin. TCP is the TCP protocol used for TCP/IP connections. host_name specifies the machine where the gateway is running.</td>
</tr>
</tbody>
</table>
Configuring Oracle Database Gateway for SQL Server

To ensure higher availability, you can specify multiple listeners within the connect descriptor.

```
connect_descriptor=
  |DESCRIPTION=
  |  |ADDRESS=
  |  |  |PROTOCOL=TCP
  |  |  |HOST=host_name_1
  |  |  |PORT=port_number_1
  |ADDRESS=
  |  |PROTOCOL=TCP
  |  |HOST=host_name_2
  |  |PORT=port_number_2
  |CONNECT_DATA=
  |  |SID=gateway_sid
  |  |HS=OK)
```

This indicates that, if the listener for `host_name_1` and `port_number_1` is not available, then the second listener for `host_name_2` and `port_number_2` will take over.

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

### Create Database Links

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

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 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 SQL Server 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.
Configure Two-Phase Commit

To access the SQL Server, you must create a database link. A public database link is the most common of database links.

```sql
SQL> CREATE PUBLIC DATABASE LINK dblink CONNECT TO
2   "user" IDENTIFIED BY "password" USING 'tns_name_entry';
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dblink</td>
<td>is the complete database link name.</td>
</tr>
<tr>
<td>tns_name_entry</td>
<td>specifies the Oracle Net connect descriptor specified in the tnsnames.ora file that identifies the gateway</td>
</tr>
</tbody>
</table>

After the database link is created you can verify the connection to the SQL Server database, as follows:

```sql
SQL> SELECT * FROM DUAL@dblink;
```

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

## Configure Two-Phase Commit

The gateway supports the following transaction capabilities:

- COMMIT_CONFIRM
- READ_ONLY
- SINGLE_SITE

The transaction model is set using the `HS_TRANSACTION_MODEL` initialization parameter. By default, the gateway runs in COMMIT_CONFIRM transaction mode. When the SQL Server database is updated by a transaction, the gateway becomes the commit point site. The Oracle database commits the unit of work in the SQL Server database after verifying that all Oracle databases in the transaction have successfully prepared the transaction. Only one gateway instance can participate in an Oracle two-phase commit transaction as the commit point site.

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

To enable the COMMIT_CONFIRM transaction mode, perform the following tasks:

1. **Create a Recovery Account and Password**
2. **Create the Transaction Log Table**

The log table, called `HS_TRANSACTION_LOG`, is where two-phase commit transactions are recorded. Alternatively users can specify a different table name by setting a gateway initialization parameter `HS_FDS_TRANSACTION_LOG` parameter. This table needs to be in the same schema as the recovery account.

## Create a Recovery Account and Password

For the gateway to recover distributed transactions, a recovery account and password must be set up in the SQL Server database. By default, both the user name of the
Configure Two-Phase Commit

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 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 dg4pwd that should be used for encryption. Refer to Section 4.2.3, ‘Encrypting Initialization parameters’ in the Oracle Database Heterogeneous Connectivity User’s Guide for further details.

1. Set up a user account in the SQL Server database. Both the user name and password must be a valid SQL Server 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 SQL Server user account you set up for recovery.
   - `HS_FDS_RECOVERY_PWD` to the password of the SQL Server user account you set up for recovery.

   **See Also:** "Customize the Initialization Parameter File" on page 9-2 for information about editing the initialization parameter file. For information about `HS_FDS_RECOVERY_ACCOUNT` and `HS_FDS_RECOVERY_PWD`, see Appendix C, "Initialization Parameters".

Create the Transaction Log Table

When configuring the gateway for two-phase commit, a table must be created in the SQL Server database for logging transactions. The gateway uses the transaction log table to check the status of failed transactions that were started at the SQL Server 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 C, "Initialization Parameters" for information about the `HS_FDS_TRANSACTION_LOG` initialization parameter.
Create SQL Server Views for Data Dictionary Support

To enable Oracle data dictionary translation support use the `dg4msql_cvw.sql` script, located in the directory `$ORACLE_HOME/dg4msql/admin` where `$ORACLE_HOME` is the directory under which the gateway is installed. You must run this script on each SQL Server database that you want to access through the gateway. Use `isql` to execute the script, as follows:

```bash
$ isql -Usa_user -Psa_pwd [-Sserver] [-ddatabase] -e -i dg4msql_cvw.sql
```

where `sa_user` and `sa_pwd` are the SQL Server system administrator user ID and password respectively.

Encrypt Gateway Initialization Parameter Values

The gateway uses user IDs and passwords to access the information in the remote database. Some user IDs 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 `dg4pwd` encryption utility has been added as part of Heterogeneous Services to help make this more secure. This utility is accessible by this gateway. The initialization parameters that contain sensitive values can be stored in an encrypted form.

See Also: Oracle Database Heterogeneous Connectivity User’s Guide for more information about using this utility.

Configure the Gateway to Access Multiple SQL Server Databases

The tasks for configuring the gateway to access multiple SQL Server 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 `dg4msql`
- The `ORACLE_HOME` environment variable is set to the directory where the gateway is installed
- The gateway is configured for one SQL Server database named `db1`
Configure the Gateway to Access Multiple SQL Server Databases

Multiple SQL Server Databases Example: Configuring the Gateway

Choose One System ID for Each SQL Server Database
A separate instance of the gateway is needed for each SQL Server database. Each instance needs its own gateway System ID (SID). For this example, the gateway SIDs are chosen for the instances that access the SQL Server databases:

- dg4msql2 for the gateway accessing database db2
- dg4msql3 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/dg4msql/admin/initdg4msql.ora, twice, naming one with the gateway SID for db2 and the other with the gateway SID for db3:

```bash
$ cd $ORACLE_HOME/dg4msql/admin
$ cp initdg4msql.ora initdg4msql2.ora
$ cp initdg4msql.ora initdg4msql3.ora
```

Change the value of the HS_FDS_CONNECT_INFO parameter in the new files.
For initdg4msql2.ora, enter the following:

```
HS_FDS_CONNECT_INFO=204.179.79.15:1433//db2
```

For initdg4msql3.ora, enter the following:

```
HS_FDS_CONNECT_INFO=204.179.79.15:1433//db3
```

Note: If you have multiple gateway SIDs for the same SQL Server 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 SQL Server Databases Example: Configuring Oracle Net Listener

Add Entries to listener.ora
Add two new entries to the Oracle Net 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:

```ora
SID_LIST_LISTENER=
(SID_LIST=
 (SID_DESC=
  (SID_NAME=dg4msql)
 (ORACLE_HOME=oracle_home_directory)
 (PROGRAM=dg4msql))
```
Configure the Gateway to Access Multiple SQL Server Databases

Multiple SQL Server Databases Example: Stopping and Starting the Oracle Net 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 SQL Server Databases Example: Configuring Oracle Database for Gateway Access

Configuring Oracle Net 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 SQL Server 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=port_number)
    (HOST=host_name))
  (CONNECT_DATA=
    (SID=sg4msql1))
  (HS=OK))
new_db2_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=port_number)
    (HOST=host_name))
  (CONNECT_DATA=
    (SID=sg4msql2))
  (HS=OK))
new_db3_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=port_number)
    (HOST=host_name))
  (CONNECT_DATA=
    (SID=sg4msql3))
  (HS=OK))
```
The value for PORT is the TCP/IP port number of the Oracle Net Listener that is listening for the gateway. The number can be found in the listener.ora file used by the Oracle Net 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 Oracle Net Listener.

Multiple SQL Server Databases Example: Accessing SQL Server Data

Enter the following to create a database link for the dg4msql2 gateway:

```sql
SQL> CREATE PUBLIC DATABASE LINK MSQL2 CONNECT TO
     2  "user2" IDENTIFIED BY "password2" USING 'new_db2_using';
```

Enter the following to create a database link for the dg4msql3 gateway:

```sql
SQL> CREATE PUBLIC DATABASE LINK MSQL3 CONNECT TO
     2  "user3" IDENTIFIED BY "password3" USING 'new_db3_using';
```

After the database links are created, you can verify the connection to the new SQL Server databases, as in the following:

```sql
SQL> SELECT * FROM ALL_USERS@MSQL2;

SQL> SELECT * FROM ALL_USERS@MSQL3;
```
Part VI, "Installing and Configuring Oracle Database Gateway for ODBC" describes how to install and configure Oracle Database Gateway for ODBC on UNIX based platforms.

It contains the following chapters:

- Chapter 10, "Installing Oracle Database Gateway for ODBC"
- Chapter 11, "Configuring Oracle Database Gateway for ODBC"
This chapter provides information about the hardware and software requirements and the installation procedure for Oracle Database Gateway for ODBC.

To install the gateway, follow these steps:

1. Ensure that the system meets all of the hardware and software requirements specified in "System Requirements for Oracle Database Gateway for ODBC" on page 10-1

2. Run the Oracle Universal Installer.

   See "Step Through the Oracle Universal Installer" on page 10-4 for more information about running the Oracle Universal Installer

   Oracle Universal Installer is a menu-driven utility that guides you through the installation of the gateway by prompting you with action items. The action items and the sequence in which they appear depend on your platform.

   See Table 10–3 for a description of the installation procedure of Oracle Database Gateway for ODBC

System Requirements for Oracle Database Gateway for ODBC

This section provides information about the hardware and software requirements for the gateway. It contains the following sections:

- "Hardware Requirements" on page 10-1
- "Software Requirements" on page 10-3

Hardware Requirements

Table 10–1 lists the minimum hardware requirements for Oracle Database Gateway for ODBC.

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit**</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for Oracle Solaris on x86-64 (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Disk Space</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
</tr>
<tr>
<td>Disk Space</td>
<td>1.5 GB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>1.5 GB</td>
</tr>
</tbody>
</table>
The minimum swap space is 1 GB (or twice the size of RAM). On systems with 2 GB or more of RAM, the swap space can be between one and two times the size of RAM. On AIX systems with 1 GB or more of memory, do not increase the swap space more than 2 GB.

** Database Gateway for ODBC on Linux x86-64 is now a 64-bit application that requires the use of a 64-bit third party ODBC Driver

### Checking the Hardware Requirements
To ensure that the system meets the minimum requirements, follow these steps:

1. To determine the physical RAM size, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># /usr/sbin/lsattr -E -l sys0 -a realmem</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># grep MemTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># /usr/sbin/prtconf</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># /usr/sbin/prtconf</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># /usr/contrib/bin/machinfo</td>
</tr>
</tbody>
</table>

   If the size of the physical RAM installed in the system is less than the required size, you must install more memory before continuing.

2. To determine the size of the configured swap space, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># /usr/sbin/lsps -a</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># grep SwapTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># /usr/sbin/swap -s</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># /usr/sbin/swap -s</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># /usr/sbin/swapinfo -a</td>
</tr>
</tbody>
</table>

   If necessary, see your operating system documentation for information about how to configure additional swap space.
3. To determine the amount of disk space available in the /tmp directory enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td><code># df -k /tmp</code></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td><code># bdf /tmp</code></td>
</tr>
</tbody>
</table>

4. To determine the amount of disk space available on the system enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td><code># df -k</code></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td><code># bdf</code></td>
</tr>
</tbody>
</table>

**Software Requirements**

The following section describes the minimum software requirements for Oracle Database Gateway for ODBC.

**Operating System**

Table 10–3 lists the minimum operating system version required for Oracle Database Gateway for ODBC. If your operating system is lower than the minimum requirements, upgrade your operating system to meet the specified levels.

**Table 10–2 Operating Systems Version for Oracle Database Gateway for ODBC**

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>AIX 5L version 5.3 TL9 or higher, AIX 6.1</td>
</tr>
<tr>
<td>Linux x86 64 bit Red Hat</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 6</td>
</tr>
<tr>
<td>Oracle Linux x86 64 bit</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 5 Update 5 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 6</td>
</tr>
<tr>
<td></td>
<td>■ Oracle Linux 6 (with the Oracle Unbreakable Enterprise Kernel for Linux)</td>
</tr>
</tbody>
</table>
Checking the Software Requirements
To ensure that the system meets the minimum requirements, follow these steps:

- To determine which version of IBM AIX on POWER Systems (64-Bit) is installed, enter the following command:
  
  ```bash
  # oslevel -r
  ```

- To determine which distribution and version of Linux x86 64 bit is installed, enter the following command:
  
  ```bash
  # cat /proc/version
  ```

- To determine which version of Oracle Solaris on SPARC (64-Bit) is installed, enter the following command:
  
  ```bash
  # uname -r
  ```

- To determine which version of Oracle Solaris on x86-64 (64-Bit) is installed, enter the following command:
  
  ```bash
  # uname -r
  ```

- To determine which version of HP-UX Itanium is installed, enter the following command:
  
  ```bash
  # uname -a
  ```

Certified Configuration
For the latest certified configuration refer to the OTN Web site:


Step Through the Oracle Universal Installer

Table 10–3 describes the installation procedure for Oracle Database Gateway for ODBC.
Table 10–3  The Oracle Universal Installer: Steps for Installing Oracle Database Gateway for ODBC

<table>
<thead>
<tr>
<th>Screen</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Universal Installer: Welcome</td>
<td>Click Next.</td>
</tr>
<tr>
<td>Oracle Universal Installer: File Locations</td>
<td>The Source section of the screen is where you specify the source location that the Oracle Universal Installer must use to install the Oracle Database Gateway for ODBC. You need not edit the file specification in the Path field. The default setting for this field points to the installer file on your gateway installation media. The Path field in the Destination section of the File Locations screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the File Locations screen as necessary, click Next to continue. After loading the necessary information from the installation, the Oracle Universal Installer displays the Available Products screen.</td>
</tr>
</tbody>
</table>
   b. Click Next. |
| Oracle Universal Installer: Summary               | The Installation Summary screen enables you to review a tree list of options and components for this installation. Click Install to start installation. |
| Oracle Net Configuration Assistant: Welcome       | Click Cancel |
| Oracle Net Configuration Assistant:               | Click Yes |
| Oracle Universal Installer: Configuration Tools   | Click Exit |
| Exit                                             | The final screen of the Oracle Universal Installer is the End of Installation screen. Click Exit to exit the installer. |
After installing the gateway and the ODBC driver for the non-Oracle system, perform the following tasks to configure Oracle Database Gateway for ODBC:

1. **Configure the Gateway Initialization Parameter File**
2. **Configure Oracle Net for the Gateway**
3. **Configure the Oracle Database for Gateway Access**
4. **Create Database Links**
5. **Encrypt Gateway Initialization Parameter Values**
6. **Configure the Gateway to Access Multiple ODBC Data Sources**

### Configure the Gateway Initialization Parameter File

Perform the following tasks to configure the gateway initialization file:

1. **Create the Initialization Parameter File**
2. **Set the Initialization Parameter Values**

### Create the Initialization Parameter File

You must create an initialization file for your Oracle Database Gateway for ODBC. Oracle supplies a sample initialization file, `initdg4odbc.ora`. The sample file is stored in the `$ORACLE_HOME/hs/admin` directory.

To create an initialization file for the ODBC gateway, copy the sample initialization file and rename it to `initsid.ora`, where `sid` is the system identifier (SID) you want to use for the instance of the non-Oracle system to which the gateway connects.

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 ODBC source you are accessing.

If you want to access two ODBC sources, you need two gateway SIDs, one for each instance of the gateway. If you have only one ODBC source but want to access it sometimes with one set of gateway parameter settings, and other times with different gateway parameter settings, then you will need multiple gateway SIDs for the single ODBC source. The SID is used as part of the file name for the initialization parameter file.
Set the Initialization Parameter Values

After the initialization file has been created, you must set the initialization parameter values. A number of initialization parameters can be used to modify the gateway behavior. You must set the HS_FDS_CONNECT_INFO and the HS_FDS_SHAREABLE_NAME initialization parameters. Other initialization parameters have defaults or are optional. You can use the default values and omit the optional parameters, or you can specify the parameters with values tailored for your installation. Refer to Appendix C, "Initialization Parameters" for the complete list of initialization parameters that can be set. Changes made to the initialization parameters only take effect in the next gateway session.

The HS_FDS_CONNECT_INFO initialization parameter specifies the information required for connecting to the non-Oracle system. Set the HS_FDS_CONNECT_INFO as follows:

```
HS_FDS_CONNECT_INFO=dsn_value
```

where dsn_value is the data source name configured in the odbc.ini file.

The HS_FDS_SHAREABLE_NAME initialization parameter specifies the full path of the ODBC driver manager. Set the HS_FDS_SHAREABLE_NAME as follows:

```
HS_FDS_SHAREABLE_NAME=full_path_of_odbc_driver
```

where full_path_of_odbc_driver is the full path to the ODBC driver manager.

---

**Note:** Before deciding whether to accept the default values or to change them, see Appendix C, "Initialization Parameters" for detailed information about all the initialization parameters.

---

Example: Setting Initialization Parameter Values

The following is an example of an odbc.ini file that uses DataDirect Technologies SQLServer ODBC driver. The ODBC driver is installed in $ODBCHOME, which is the /opt/odbc520 directory.

```
[ODBC Data Sources]
SQLServerWP=DataDirect 5.20 SQL Server Wire Protocol

[SQLServerWP]
Driver=/opt/odbc520/lib/ivmsssql.so
Description=DataDirect 5.20 SQL Server Wire Protocol
Database=oratst
LogonID=TKHOUSER
Password=TKHOUSER
Address=sqlserver-pc,1433
QuotedId=Yes
AnsiNPW=No

[ODBC]
Trace=0
TraceFile=/opt/odbc520/odbctrace.out
TraceDll=/opt/odbc520/lib/odbctrac.so
InstallDir=/opt/odbc520
ConversionTableLocation=/opt/odbc520/tables
UseCursorLib=0
```

To configure the Gateway for ODBC to use this driver, the following lines are required in initсид.ora:
Configure Oracle Net for the Gateway

The gateway requires Oracle Net to communicate with the Oracle database. After configuring the gateway, perform the following tasks to configure Oracle Net to work with the gateway:

1. Configure Oracle Net Listener for the Gateway
2. Stop and Start the Oracle Net Listener for the Gateway

Configure Oracle Net Listener for the Gateway

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

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

- A list of Oracle Net addresses on which the Oracle Net Listener listens
- The executable name of the gateway that the Oracle Net Listener starts in response to incoming connection requests

A sample of the listener.ora entry (listener.ora.sample) is available in the $ORACLE_HOME/hs/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

Syntax of listener.ora File Entries

The Oracle database communicates with the gateway using Oracle Net and any supported protocol adapters. The following is the syntax of the address on which the Oracle Net Listener listens using the TCP/IP protocol adapter:

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

Where:

Note: If the ODBC driver supports Quoted Identifiers or Delimited Identifiers it should be turned on.
To direct the Oracle Net Listener to start the gateway in response to incoming connection requests, add an entry to the listener.ora file.

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

For Linux:

```
SID_LIST_LISTENER=
 (SID_LIST=
  (SID_DESC=
    (SID_NAME=gateway_sid)
    (ORACLE_HOME=oracle_home_directory)
    (PROGRAM=dg4odbc)
    (ENVS=LD_LIBRARY_PATH=odbc_library_dir:oracle_home_directory/lib)
  )
 )
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>host_name</code></td>
<td>is the name of the machine on which the gateway is installed. IPv6 format is supported with this release. Refer to Oracle Database Net Services Reference for detail.</td>
</tr>
<tr>
<td><code>port_number</code></td>
<td>specifies the port number used by the Oracle Net Listener. If you have other listeners running on the same machine, then the value of <code>port_number</code> must be different from the other listeners’ port numbers.</td>
</tr>
</tbody>
</table>

If you already have an existing Oracle Net Listener, then add the following syntax to `SID_LIST` in the existing listener.ora file:

For Linux:

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>gateway_sid</code></td>
<td>specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the tnsnames.ora file.</td>
</tr>
<tr>
<td><code>oracle_home_directory</code></td>
<td>specifies the Oracle home directory where the gateway resides.</td>
</tr>
<tr>
<td><code>odbc_library_dir</code></td>
<td>specifies the ODBC driver library path</td>
</tr>
<tr>
<td><code>dg4odbc</code></td>
<td>specifies the executable name of the Oracle Database Gateway for ODBC.</td>
</tr>
</tbody>
</table>
Configure Oracle Net for the Gateway

Configuring Oracle Database Gateway for ODBC

1. Set the `PATH` environment variable to `$ORACLE_HOME/bin` where `$ORACLE_HOME` is the directory in which the gateway is installed.

   For example on the Linux platform, if you have the Bourne or Korn Shell, enter the following:
   
   ```bash
   $ PATH=$ORACLE_HOME/bin:$PATH; export PATH
   $ LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH
   
   If you have the C Shell, enter the following:
   
   ```bash
   $ setenv PATH $ORACLE_HOME/bin:$PATH
   $ setenv LD_LIBRARY_PATH $ORACLE_HOME/lib:$LD_LIBRARY_PATH
   ```

   Table 11–1 specifies which parameter value to use for the different platforms:

   **Table 11–1 Parameter Values for UNIX Based Platforms**

<table>
<thead>
<tr>
<th>Platform</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris (SPARC) 64 bit and</td>
<td>LD_LIBRARY_PATH_64=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>LIBPATH=$ORACLE_HOME/lib</td>
</tr>
</tbody>
</table>

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:

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

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

   ```bash
   $ lsnrctl status
   
   The following is a partial output from a `lsnrctl status` check. In this example `dg4odbc` is the SID.

   .
   .
   .
   Services Summary...
   Service 'dg4odbc' has 1 instance(s).
   Instance 'dg4odbc', status UNKNOWN, has 1 handler(s) for this service...
   The command completed successfully

See Also: Oracle Net Administrator’s Guide for information about changing the listener.ora file.
Configure the Oracle Database for Gateway Access

Before you use the gateway to access an ODBC data source you must configure the Oracle database to enable communication with the gateway over Oracle Net.

To configure the Oracle database you must add connect descriptors to the tnsnames.ora file. By default, this file is in $ORACLE_HOME/network/admin, where $ORACLE_HOME is the directory in which the Oracle database is installed. You cannot use the Oracle Net Assistant or the Oracle Net Easy Config tools to configure the tnsnames.ora file. You must edit the file manually.

A sample of the tnsnames.ora entry (tnsnames.ora.sample) is available in the $ORACLE_HOME/dg4odbc/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

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

Configuring tnsnames.ora

Edit the tnsnames.ora file to add a connect descriptor for the gateway. The following is the syntax of the Oracle Net entry using the TCP/IP protocol:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect_descriptor</td>
<td>is the description of the object to connect to as specified when creating the database link, such as dg4oddbc.</td>
</tr>
<tr>
<td>host_name</td>
<td>specifies the machine where the gateway is running.</td>
</tr>
<tr>
<td>port_number</td>
<td>matches the port number used by the Oracle Net Listener that is listening for the gateway. The Oracle Net Listener’s port number can be found in the listener.ora file used by the Oracle Net Listener. See “Syntax of listener.ora File Entries” on page 11-3.</td>
</tr>
<tr>
<td>gateway_sid</td>
<td>specifies the SID of the gateway and matches the SID specified in the listener.ora file of the Oracle Net Listener that is listening for the gateway. See “Configure Oracle Net Listener for the Gateway” on page 11-3 for more information.</td>
</tr>
<tr>
<td>(HS=OK)</td>
<td>specifies that this connect descriptor connects to a non-Oracle system.</td>
</tr>
</tbody>
</table>

Check the sqlnet.ora file for the following parameter setting:

```
names.directory_path = (TNSNAMES)
```

Note: The sqlnet.ora file is typically stored in $ORACLE_HOME/network/admin.

TCP is the TCP protocol used for TCP/IP connections.

See "Syntax of listener.ora File Entries" on page 11-3.
Configuring tnsnames.ora for Multiple Listeners

To ensure higher availability, you can specify multiple listeners within the connect descriptor.

```plaintext
connect_descriptor=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=host_name_1)
      (PORT=port_number_1)
    )
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=host_name_2)
      (PORT=port_number_2)
    )
    (CONNECT_DATA=
      (SID=gateway_sid)
      (HS=OK)
    )
  )
```

This indicates that, if the listener for `host_name_1` and `port_number_1` is not available, then the second listener for `host_name_2` and `port_number_2` will take over.

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

Create Database Links

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

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 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 ODBC data source.

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.

To access the ODBC data source, you must create a database link. A public database link is the most common of database links.

```sql
SQL> CREATE PUBLIC DATABASE LINK dblink CONNECT TO 
  2   "user" IDENTIFIED BY "password" USING 'tns_name_entry';
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dblink</code></td>
<td>is the complete database link name.</td>
</tr>
<tr>
<td><code>tns_name_entry</code></td>
<td>specifies the Oracle Net connect descriptor specified in the tnsnames.ora file that identifies the gateway</td>
</tr>
</tbody>
</table>

After the database link is created you can verify the connection to the ODBC data source, as follows:

```sql
SQL> SELECT * FROM DUAL@dblink;
```
Encrypt Gateway Initialization Parameter Values

The gateway uses user IDs and passwords to access the information in the remote database. Some user IDs 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 $dg4pwd$ encryption utility has been added as part of Heterogeneous Services to help make this more secure. This utility is accessible by this gateway. The initialization parameters that contain sensitive values can be stored in an encrypted form.

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

Encrypt Gateway Initialization Parameter Values

The gateway uses user IDs and passwords to access the information in the remote database. Some user IDs 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 $dg4pwd$ encryption utility has been added as part of Heterogeneous Services to help make this more secure. This utility is accessible by this gateway. The initialization parameters that contain sensitive values can be stored in an encrypted form.

See Also: Oracle Database Heterogeneous Connectivity User’s Guide for more information about using this utility.

Configure the Gateway to Access Multiple ODBC Data Sources

The tasks for configuring the gateway to access multiple ODBC data sources are similar to the tasks for configuring the gateway for a single data source. The configuration example assumes the following:

- The gateway is installed and configured with the SID of $dg4odbc$.
- The gateway is configured to access one ODBC data source named $dsn1$.
- Two ODBC data sources named $dsn2$ and $dsn3$ where $dsn2$ and $dsn3$ are the data source names configured in the odbc.ini file, are being added.

Multiple ODBC Data Sources Example: Configuring the Gateway

Choose One System ID for Each ODBC Data Source

A separate instance of the gateway is needed for each ODBC data source. Each instance needs its own gateway System ID (SID). For this example, the gateway SIDs are chosen for the instances that access the ODBC data source:

- $dg4odbc2$ for the gateway accessing data source $dsn2$.
- $dg4odbc3$ for the gateway accessing data source $dsn3$.

Create Two Initialization Parameter Files

Create an initialization parameter file for each instance of the gateway by copying the original initialization parameter file $ORACLE_HOME/hs/admin/initdg4odbc.ora$, twice, naming one with the gateway SID for $dsn2$ and the other with the gateway SID for $dsn3$:

```
$ cd $ORACLE_HOME/hs/admin
$ cp initdg4odbc.ora initdg4odbc2.ora
$ cp initdg4odbc.ora initdg4odbc3.ora
```

Change the value of the $HS\_FDS\_CONNECT\_INFO$ parameter in the new files, as follows:

For $initdg4odbc2.ora$, enter the following:
HS_FDS_CONNECT_INFO=dsn2

For initdg4odbc3.ora, enter the following:
HS_FDS_CONNECT_INFO=dsn3

---

**Note:** If you have multiple gateway SIDs for the same ODBC data source 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 ODBC Data Sources Example: Configuring Oracle Net Listener**

**Add Entries to listener.ora**

Add two new entries to the Oracle Net 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.

```sql
SID_LIST_LISTENER=
{SID_LIST=
  {SID_DESC=
    {SID_NAME=dg4odbc}
    {ORACLE_HOME=oracle_home_directory}
    {PROGRAM=dg4odbc}
    {ENVS=LD_LIBRARY_PATH=odbc_library_dir:oracle_home_directory/lib}
  }
  {SID_DESC=
    {SID_NAME=dg4odbc2}
    {ORACLE_HOME=oracle_home_directory}
    {PROGRAM=dg4odbc}
    {ENVS=LD_LIBRARY_PATH=odbc_library_dir:oracle_home_directory/lib}
  }
  {SID_DESC=
    {SID_NAME=dg4odbc3}
    {ORACLE_HOME=oracle_home_directory}
    {PROGRAM=dg4odbc}
    {ENVS=LD_LIBRARY_PATH=odbc_library_dir:oracle_home_directory/lib}
  }
}
```

where, `oracle_home_directory` is the directory where the gateway resides.

---

**Multiple ODBC Data Sources Example: Stopping and Starting the Oracle Net 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 ODBC Data Sources Example: Configuring Oracle Database for Gateway Access

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

```
old_dsn_using=(DESCRIPTION=
    (ADDRESS=
        (PROTOCOL=TCP)
        (PORT=port_number)
        (HOST=host_name))
    (CONNECT_DATA=
        (SID=dg4odbc))
    (HS=OK))
new_dsn2_using=(DESCRIPTION=
    (ADDRESS=
        (PROTOCOL=TCP)
        (PORT=port_number)
        (HOST=host_name))
    (CONNECT_DATA=
        (SID=dg4odbc2))
    (HS=OK))
new_dsn3_using=(DESCRIPTION=
    (ADDRESS=
        (PROTOCOL=TCP)
        (PORT=port_number)
        (HOST=host_name))
    (CONNECT_DATA=
        (SID=dg4odbc3))
    (HS=OK))
```

The value for PORT is the TCP/IP port number of the Oracle Net Listener that is listening for the gateway. The number can be found in the listener.ora file used by the Oracle Net 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 Oracle Net Listener.

Multiple ODBC Data Sources Example: Accessing ODBC Data

Enter the following to create a database link for the dg4odbc2 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK ODBC2 CONNECT TO 
    2  "user2" IDENTIFIED BY 'password2' USING 'new_dsn2_using';
```

Enter the following to create a database link for the dg4odbc3 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK ODBC3 CONNECT TO 
    2  "user3" IDENTIFIED BY 'password3' USING 'new_dsn3_using';
```

After the database links are created, you can verify the connection to the new ODBC data sources, as in the following:

```
SQL> SELECT * FROM ALL_USERS@ODBC2;
SQL> SELECT * FROM ALL_USERS@ODBC3;
```
Part VII, "Installing and Configuring Oracle Database Gateway for DRDA" describes how to install and configure Oracle Database Gateway for DRDA on UNIX based platforms.

It contains the following chapters:

- Chapter 12, "Installing Oracle Database Gateway for DRDA"
- Chapter 13, "Configuring the DRDA Server"
- Chapter 14, "Configuring Oracle Database Gateway for DRDA"
- Chapter 15, "Security Considerations"
- Chapter 16, "Migration From Previous Releases"
This chapter provides information about the hardware and software requirements and the installation procedure of Oracle Database Gateway for DRDA.

To install the gateway, follow these steps:

1. Ensure that the system meets all of the hardware and software requirements specified in "System Requirements for Oracle Database Gateway for DRDA" on page 12-1.

2. Run the Oracle Universal Installer.

   See "Step through the Oracle Universal Installer" on page 12-5 for more information about running the Oracle Universal Installer.

   Oracle Universal Installer is a menu-driven utility that guides you through the installation of the gateway by prompting you with action items. The action items and the sequence in which they appear depend on your platform.

   See Table 12–3 for a description of the installation procedure of Oracle Database Gateway for DRDA.

### System Requirements for Oracle Database Gateway for DRDA

This section provides information about the hardware and software requirements for the gateway. It contains the following sections:

- "Hardware Requirements" on page 12-1
- "Software Requirements" on page 12-3

#### Hardware Requirements

Table 12–1 lists the minimum hardware requirements for Oracle Database Gateway for DRDA.

<table>
<thead>
<tr>
<th>Hardware Items</th>
<th>Required for IBM AIX on POWER Systems (64-Bit)</th>
<th>Required for Linux x86 64 bit</th>
<th>Required for Oracle Solaris on SPARC (64-Bit)</th>
<th>Required for Oracle Solaris on x86-64 (64-Bit)</th>
<th>Required for HP-UX Itanium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary Disk Space</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
<td>400 MB</td>
</tr>
<tr>
<td>Disk Space</td>
<td>1.5 GB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>750 MB</td>
<td>1.5 GB</td>
</tr>
</tbody>
</table>
The minimum swap space is 1 GB (or twice the size of RAM). On systems with 2 GB or more of RAM, the swap space can be between one and two times the size of RAM. On AIX systems with 1 GB or more of memory, do not increase the swap space more than 2 GB.

For most installations, a minimum of 256 MB of real memory is recommended for the first user to support the Oracle Database Gateway for DRDA.

The total real memory requirement for each concurrent use of the gateway depends on the following factors:

- Number of concurrent TCP/IP connections open by each user
- Number of data items being transferred between the gateway and the remote transaction program
- Additional factors such as configured network buffer size

Checking the Hardware Requirements

To ensure that the system meets the minimum requirements, follow these steps:

1. To determine the physical RAM size, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># /usr/sbin/lsattr -E -l sys0 -a realmem</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># grep MemTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># /usr/sbin/prtconf</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># /usr/sbin/prtconf</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># /usr/contrib/bin/machinfo</td>
</tr>
</tbody>
</table>

If the size of the physical RAM installed in the system is less than the required size, you must install more memory before continuing.

2. To determine the size of the configured swap space, enter one of the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># /usr/sbin/lsp -a</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># grep SwapTotal /proc/meminfo</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># /usr/sbin/sw -s</td>
</tr>
</tbody>
</table>
Installing Oracle Database Gateway for DRDA

1. If necessary, see your operating system documentation for information about how to configure additional swap space.

3. To determine the amount of disk space available in the /tmp directory enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># df -k /tmp</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># bdf /tmp</td>
</tr>
</tbody>
</table>

4. To determine the amount of disk space available on the system enter the following commands:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td># df -k</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td># df -k</td>
</tr>
<tr>
<td>Oracle Solaris on SPARC (64-Bit)</td>
<td># df -k</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td># df -k</td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td># bdf</td>
</tr>
</tbody>
</table>

Software Requirements

The following section describes the minimum software requirements for Oracle Database Gateway for DRDA.

Operating System

Table 12–2 lists the minimum operating system version required for Oracle Database Gateway for DRDA. If your operating system is lower than the minimum requirements, upgrade your operating system to meet the specified levels.

Table 12-2  Operating Systems Version for Oracle Database Gateway for DRDA

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>AIX 5L version 5.3 TL9 or higher, AIX 6.1</td>
</tr>
<tr>
<td>Linux x86 64 bit Red Hat</td>
<td>One of the following operating system versions:</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 4.0, (Update 7 or later)</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 5 Update 2</td>
</tr>
<tr>
<td></td>
<td>■ Red Hat Enterprise Linux 6</td>
</tr>
</tbody>
</table>
Checking the Software Requirements

To ensure that the system meets the minimum requirements, follow these steps:

- To determine which version of IBM AIX on POWER Systems (64-Bit) is installed, enter the following command:
  ```
  # oslevel -r
  ```

- To determine which distribution and version of Linux x86 64 bit is installed, enter the following command:
  ```
  # cat /proc/version
  ```

- To determine which version of Oracle Solaris on SPARC (64-Bit) is installed, enter the following command:
  ```
  # uname -r
  ```

- To determine which version of Oracle Solaris on x86-64 (64-Bit) is installed, enter the following command:
  ```
  # uname -r
  ```

- To determine which version of HP-UX Itanium is installed, enter the following command:
  ```
  # uname -a
  ```
Certified Configuration
The gateway supports DB2 UDB for Linux, Unix and Windows, DB2 UDB for z/OS, and DB2 UDB for iSeries. For the latest versions supported refer to the OTN Web site:

Step through the Oracle Universal Installer
Start the Installer with the following command:
$ ./runInstaller

Table 12–3 describes the installation procedure for Oracle Database Gateway for DRDA.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Universal Installer: Welcome</td>
<td>Click Next.</td>
</tr>
<tr>
<td>Oracle Universal Installer: Specify Home Details</td>
<td>Specify a name for the installation in the Name field. You can also choose not to edit the default setting of the Name field of the Specify Home Details screen. The Path field in the Specify Home Details screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the Specify Home Details screen as necessary, click Next to continue. After loading the necessary information from the installation, the Oracle Universal Installer displays the Available Products screen.</td>
</tr>
</tbody>
</table>
b. Click Next. |
| Oracle Universal Installer: DB2 UDB Server hostname or IP address | Specify the host name or the IP address of the machine hosting the DB2 UDB database server. This release supports IPv6 format. |
| Oracle Universal Installer: DB2 UDB DRDA server listener port | Specify the port number DB2 DRDA process listens on. |
| Oracle Universal Installer: DB2 UDB Database Name | Specify the DB2 UDB database name. |
| Oracle Universal Installer: DB2 UDB target type | For DB2 UDB running on z/OS specify ZOS.  
For DB2 UDB running on iSeries or AS/400 machines specify IOS.  
For DB2 UDB running on Linux, Unix, or Windows platforms specify LUW. |
| Oracle Universal Installer: Summary | The Installation Summary screen enables you to review a tree list of options and components for this installation. Click Install to start installation. |
| Oracle Net Configuration Assistant: Welcome | Click OK. |
| Oracle Net Configuration Assistant: Click Typical configuration. |
| Oracle Universal Installer: Configuration Tools | Click Exit. |
| Exit | The final screen of the Oracle Universal Installer is the End of Installation screen. Click Exit to exit the installer. |
This chapter describes tasks you must perform to configure the DRDA server. Each supported operating system is addressed separately. Experience with the given operating system and database is required.

The steps for configuring your remote DRDA server apply to the following DRDA servers:

- DB2 UDB for z/OS
- DB2 UDB for iSeries
- DB2 UDB for Linux, Unix, and Windows

Configuring a DRDA database to enable access by the gateway requires actions on the DRDA database and on certain components of the host operating system. Although no Oracle software is installed on the host system, access to, and some knowledge of the host system and DRDA database are required during the configuration. Refer to the vendor documentation for complete information about your host system and DRDA database.

This chapter contains the following sections:

- Configuring the DRDA Server for DB2 UDB for z/OS
- Configuring the DRDA Server for DB2 UDB for iSeries
- Configuring the DRDA Server for DB2 UDB for Linux, Unix, and Windows
- Manual Binding of DRDA Gateway Packages

## Configuring the DRDA Server for DB2 UDB for z/OS

Perform the following tasks to configure the DRDA server with DB2 on an z/OS system:

1. Define the user ID that owns the package

   During first gateway usage for a particular DRDA server, an Oracle supplied package will be automatically bound to the DRDA server. The user ID and password that are used (either implied as the current Oracle user or explicitly defined in the `CREATE DATABASE LINK` command) must have proper authority on the DRDA Server to create the package. The followings are minimum authorities needed by this user:

   - Package privileges of `BIND`, `COPY`, and `EXECUTE`, for example:

     ```
     GRANT BIND ON PACKAGE oraclegtw.* TO userid
     GRANT COPY ON PACKAGE oraclegtw.* TO userid
     GRANT EXECUTE ON PACKAGE oraclegtw.* TO PUBLIC
     ```
- Collection privilege of `CREATE IN`, for example:
  
  ```sql
  GRANT CREATE IN COLLECTION oraclegtw TO userid
  ```

- System privileges of `BINDADD` and `BINDAGENT`, for example:

  ```sql
  GRANT BINDADD TO userid
  GRANT BINDAGENT TO userid
  ```

- Database privilege of `CREATETAB`, for example:

  ```sql
  GRANT CREATETAB ON DATABASE database TO userid
  ```

Optionally, you can choose manual binding of the DRDA Gateway package. See Section , "Manual Binding of DRDA Gateway Packages" for instruction on how to manually bind packages for DB2 UDB for z/OS.

Choose a user ID that will own the package and ensure that this user ID is defined to both DB2 and OS/390 (MVS).

2. Define the recovery user ID

During gateway configuration, the recovery user ID and password are specified in the gateway initialization file using the `HS_FDS_RECOVERY_ACCOUNT` and `HS_FDS_RECOVERY_PWD` parameters. If a distributed transaction fails, then the recovery process connects to the remote database using the user ID and password that are defined in these parameters. This user ID must have execute privileges on the package and must be defined in the DRDA database. If the user ID is not specified in `HS_FDS_RECOVERY_ACCOUNT`, then the gateway attempts to connect to a user ID of `RECOVER` when a distributed transaction is in doubt.

Determine the user ID and password that you will use for recovery.

The recovery user should own the `HS_TRANSACTION_LOG` table.

3. Determine DRDA location name for DB2 instance

The DRDA location name is required as a gateway parameter. To determine the location name, run the following SQL query from a DB2 SPUFI session:

```sql
SELECT CURRENT SERVER FROM any_table
```

where `any_table` is a valid table with one or more rows.

If the value returned by this query is blank or null, then the DRDA location name has not been established. Contact the system administrator to arrange to set a location name for the instance.

4. Configure DB2 Distributed Data Facility for Gateway

DB2 Distributed Data Facility (DDF) is the component of DB2 that manages all distributed database operations, both DRDA and non-DRDA.

If your site uses DB2 distributed operations, then DDF is probably operational on the DB2 instance that you plan to access through the gateway. If DDF is not operational, then you must configure it and start it as described in the appropriate DB2 documentation.

Even if DDF is operational on the DB2 instance, it might be necessary to make changes to the DDF Communication Database (CDB) tables to specify the authorization conduct of DRDA sessions from the gateway. This can be done by properly authorized users with a utility such as the DB2 SPUFI utility. If you make changes to CDB tables, then you must stop and restart DDF for the changes to take
effect. Refer to Chapter 15, "Security Considerations", for additional CDB tables and security information.

5. Optional step: Install Oracle Date Exit in DB2 on z/OS

Oracle provides a DB2 Date Exit which allows customers to specify date strings using Oracle's native syntax. Installing the exit requires uploading the assembler source and JCL, customizing the JCL, and running the jobs to assemble and install the date exit. Perform the following steps to install Oracle Date Exit.

a. Allocate a Partitioned DataSet using the parameters DSORG=PO, RECFM=FB, LRECL=80, and BLKSIZE=6160. For example, userid.SRCLIB

b. FTP the following files from $ORACLE_HOME/dg4db2/admin to the previously allocated PDS in ASCII mode as the following PDS members:
   - dg4db2_zos_dta.asm  ->  DSNXVDTA
   - dg4db2_zos_dta.jcl  ->  ORAXVDTA
   - dg4db2_zos_dtx.asm  ->  DSNXVDTX
   - dg4db2_zos_dtx.jcl  ->  ORAXVDTX

c. Edit the ORA* JCL and follow the instructions to update the JCL. Once updated, submit the JCL to assemble, link, and install the exit.

Configuring the DRDA Server for DB2 UDB for iSeries

Experience with DB2 UDB for iSeries and AS/400 is required to perform the following steps:

1. Define the user ID that owns the package

During gateway configuration, you will need to run the Bind Package Stored Procedure to bind the gateway package on the DRDA Server. To properly bind the package, the user ID and password used when the procedure is run (either implied as the current Oracle user or explicitly defined in the CREATE DATABASE LINK command) must have proper authority on the DRDA Server to create the package. This user ID should be used to create and own the HS_TRANSACTION_LOG table. The user ID that is used to bind or rebind the DRDA package must have the following privileges on the DRDA Server:
   - Use authority on the CRTSQLPKG command:
   - Change authority on the library in which the package will be created

Choose a user ID now that will own the package and ensure that this user ID is defined in DB2 UDB for iSeries and AS/400.

2. Define the recovery user ID

During gateway configuration, the recovery user ID and password are specified in the gateway initialization file using the HS_FDS_RECOVERY_ACCOUNT and HS_FDS_RECOVERY_PWD parameters. If a distributed transaction fails, then the recovery process connects to the remote database using the user ID and password that are defined in these parameters. This user ID must have execute privileges on the package and must be defined to the DRDA database. If the user ID is not specified in HS_FDS_RECOVERY_ACCOUNT, then the gateway attempts to connect to a user ID of RECOVER when a distributed transaction is in doubt.

Determine the user ID and password that you will use for recovery.
The recovery user should own the HS_TRANSACTION_LOG table.

3. Determine DRDA location name for DB2 UDB for iSeries instance

The DRDA location name is required as a gateway parameter. To determine the location name, run the following SQL query from a STRSQL session. If SQL is unavailable on the system, then use the AS/400 command DSPRDBDIRE to identify your LOCAL DRDA Server.

```sql
SELECT CURRENT SERVER FROM any_table
```

where any_table is a valid table with one or more rows.

If the value returned by this query is blank or null, then the DRDA location name has not been established. Contact the system administrator to arrange to set a location name for the instance.

---

**Configuring the DRDA Server for DB2 UDB for Linux, Unix, and Windows**

Experience with DB2 UDB for Linux, Unix, and Windows, configuring the communication subsystem of DB2 UDB for Linux, Unix, and Windows, and the host System Administration tools is required to perform the following steps:

1. Define the user ID that owns the package

   During first gateway usage for a particular DRDA server, an Oracle supplied package will be automatically bound to the DRDA server. The user ID and password that are used (either implied as the current Oracle user or explicitly defined in the CREATE DATABASE LINK command) must have proper authority on the DRDA Server to create the package. The followings are minimum authorities needed by this user:

   - **Package privileges of BIND and EXECUTE**, for example:
     
     ```sql
     GRANT BIND ON PACKAGE oraclegtw.* TO userid
     GRANT EXECUTE ON PACKAGE oraclegtw.* TO PUBLIC
     ```

   - **Schema privilege of CREATEIN**, for example:
     
     ```sql
     GRANT CREATEIN ON SCHEMA otgdb2 TO userid
     GRANT CREATEIN ON SCHEMA oraclegtw TO userid
     ```

   - **Database authorities of CONNECT, BINDADD, and CREATETAB**, for example:
     
     ```sql
     GRANT CONNECT ON DATABASE TO userid
     GRANT BINDADD ON DATABASE TO userid
     GRANT CREATETAB ON DATABASE TO userid
     ```


   Choose a user ID that will own the package and ensure that this user ID is defined in both the DB2 instance ID and the operating system.

2. Define the recovery user ID

   During gateway configuration, the recovery user ID and password are specified in the gateway initialization file using the HS_FDS_RECOVERY_ACCOUNT and HS_FDS_RECOVERY_PWD parameters. If a distributed transaction fails, then the recovery process connects to the remote database using the user ID and password that are defined in these parameters. This user ID must have execute privileges on the
package and must be defined to the DRDA database. If the user ID is not specified in `HS_FDS_RECOVERY_ACCOUNT`, then the gateway attempts to connect to a user ID of `RECOVER` when a distributed transaction is in doubt.

Determine the user ID and password that you will use for recovery.

The recovery user should own the `HS_TRANSACTION_LOG` table.

3. Determine DRDA location name for DB2 UDB for Linux, Unix, and Windows instance

The DRDA location name is required as a gateway parameter. To determine the location name, run the following SQL query from a DB2 CLI session:

```
SELECT CURRENT SERVER FROM any_table
```

where `any_table` is a valid table with one or more rows.

If the value returned by this query is blank or null, then the DRDA location name has not been established. Contact your system administrator to set a location name for the instance.

---

**Manual Binding of DRDA Gateway Packages**

The gateway uses several DB2 packages, which it normally uploads and binds during the first time the gateway connects to a DB2 instance. In some customer environments, the connecting userid may not have the necessary privileges to perform the binding, or some customers may prefer to manually bind the packages rather than allow the gateway to do the binding.

In such cases, Oracle provides a predefined set of packages for manual binding. These packages come with several restrictions that must be observed by setting specific gateway initialization parameters to set values otherwise, the gateway will attempt to rebind the package automatically.

This section contains the following sub-sections:

- Manually Binding of Packages for DB2 UDB for z/OS
- Manually Binding of Packages for DB2 UDB for Linux, Unix, and Windows

---

**Manually Binding of Packages for DB2 UDB for z/OS**

Perform the following steps to manually bind packages for DB2 UDB for z/OS:

1. Allocate a sequential dataset on z/OS using the parameters `DSORG=PS`, `RECFM=FB`, `LRECL=80`, and `BLKSIZE=3120`. For example,
   ```
   userid.DBRMFILE.XMIT
   ```

2. Allocate a Partitioned DataSet using the parameters `DSORG=PO`, `RECFM=FB`, `LRECL=80`, and `BLKSIZE=6160`. For example,
   ```
   userid.TG4DRDA.CNTL
   ```

3. FTP the following file to the previously allocated sequential dataset in **BINARY** mode:
   ```
   $ORACLE_HOME/dg4db2/admin/dg4db2_zos_dbrm.xmit
   ```
   Use the `PUT` command to replace the sequential dataset contents.

4. FTP the following file to the previously allocated PDS in **ASCII** mode:
Manual Binding of DRDA Gateway Packages

$ORACLE_HOME/dg4db2/admin/dg4db2_zos_bind.jcl

Use the **PUT** command to place the file into the PDS as member name **BIND**.

5. Use the TSO command option of ISPF (option 6) to issue the **RECEIVE** command:

```
RECEIVE INDS('userid.DBRMFILE.XMIT')
```

Specify DA(userid.DDODBC.DBRMLIB) as the parameters to the **RECEIVE** command. This will unpack the xmit file and create the specified PDS name.

6. Edit the **BIND JCL** (userid.TG4DRDA.CNTL(BIND)) and follow the instructions to update the JCL. Once updated, submit the JCL to perform the actual binding of the packages and granting of execution privileges on the packages.

To use these packages with the gateway, please set the following init parameters in the gateway initialization file:

- **HS_OPEN_CURSORS=200**
- **HS_FDS_PACKAGE_COLLID=NULLID**

**Manually Binding of Packages for DB2 UDB for Linux, Unix, and Windows**

Perform the following steps to manually bind packages for DB2 UDB for Linux, Unix, and Windows:

1. Copy the following files to the host running the DB2 instance from the $ORACLE_HOME/dg4db2/admin directory:

```
DDOC510A.bnd
DDOC510B.bnd
DDOC510C.bnd
DDON510A.bnd
DDON510B.bnd
DDON510C.bnd
DDOR510A.bnd
DDOR510B.bnd
DDOR510C.bnd
DDOS510A.bnd
DDOS510B.bnd
DDOS510C.bnd
DDOU510A.bnd
DDOU510B.bnd
DDOU510C.bnd
dg4db2_luw_pkglist.lst
```

If copying via FTP, then files ending in .bnd should be transferred in BINARY mode and files ending in .lst should be transferred in ASCII mode.

2. Connect to the DB2 instance and issue the bind command. For example,

```
$ db2 'connect to <database_name> user <userid> using <password>'
$ db2 'bind @dg4db2_luw_pkglist.lst grant public'
```

To use these packages with the gateway, set the following initialization parameters in the gateway initialization file:

- **HS_OPEN_CURSORS=200**
- **HS_FDS_PACKAGE_COLLID=NULLID**

13-6 Oracle Database Gateway Installation and Configuration Guide
After installing the gateway, perform the following tasks to configure Oracle Database Gateway for DRDA:

1. Configure the Gateway Initialization Parameter File
2. Configure Oracle Net for the Gateway
3. Configure Two-Phase Commit
4. Create Tables and Views for Data Dictionary Support
5. Configure the Oracle Database for Gateway Access
6. Create Database Links
7. Configure the Gateway to Access Multiple DRDA Databases

SQL scripts are provided to perform steps such as creating the `HS_TRANSACTION_LOG` table, removing obsolete tables and views, and creating tables and views to provide data dictionary support.

These scripts must be run on the DRDA Server platform using a database native tool (such as SPUFI on DB2 UDB for z/OS), because no tool is provided with the gateway to execute these scripts. Note that when running these scripts, the user ID used must be suitably authorized.

SQL scripts are located in the `dg4db2/admin` directory. Appropriate platform scripts are designated by having the DB2 platform identifiers (eg: "zos", "as400" and "luw") and version specific numbers (eg: vw7, vw8) in their file names.

**Configure the Gateway Initialization Parameter File**

Perform the following tasks to configure the gateway initialization parameter file:

1. Choose a System Identifier for the Gateway
2. Customize the Initialization Parameter File

**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 DRDA database you are accessing. However, if you want to access two DRDA databases, you need two gateway SIDs, one for each instance of the gateway. If you have one DRDA 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 DRDA database. The SID is used as part of the file name for the initialization parameter file.

**Customize the Initialization Parameter File**

Tailor the parameter file with additional parameters as needed. Refer to Appendix C, "Initialization Parameters" for a list of supported initialization parameters. Also refer to Chapter 15, "Security Considerations" for security aspects to tailoring the parameter file.

**Configure Oracle Net for the Gateway**

The gateway requires Oracle Net to communicate with the Oracle database. After configuring the gateway, perform the following tasks to configure Oracle Net to work with the gateway:

1. **Configure Oracle Net Listener for the Gateway**
2. **Stop and Start the Oracle Net Listener for the Gateway**

**Configure Oracle Net Listener for the Gateway**

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

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

- A list of Oracle Net addresses on which the Oracle Net Listener listens
- The executable name of the gateway that the Oracle Net Listener starts in response to incoming connection requests

A sample of the `listener.ora` entry (`listener.ora.sample`) is available in the `$ORACLE_HOME/dg4db2/admin` directory where `$ORACLE_HOME` is the directory under which the gateway is installed.

**Syntax of listener.ora File Entries**

The Oracle database communicates with the gateway using Oracle Net and any supported protocol adapters. The syntax of the address on which the Oracle Net Listener listens using the TCP/IP protocol adapter is as follows:

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

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>host_name</code></td>
<td>is the name of the machine on which the gateway is installed. IPv6 format is supported with this release. Refer to Oracle Database Net Services Reference for detail.</td>
</tr>
</tbody>
</table>
To direct the Oracle Net Listener to start the gateway in response to incoming connection requests, add an entry to the `listener.ora` file.

```
SID_LIST_LISTENER=
    (SID_LIST=
      (SID_DESC=
        (SID_NAME=gateway_sid)
        (ORACLE_HOME=oracle_home_directory)
        (PROGRAM=dg4db2)
      )
    )
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>port_number</code></td>
<td>specifies the port number used by the Oracle Net Listener. If you have other listeners running on the same machine, then the value of <code>port_number</code> must be different from the other listeners' port numbers.</td>
</tr>
<tr>
<td><code>gateway_sid</code></td>
<td>specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the <code>tnsnames.ora</code> file.</td>
</tr>
<tr>
<td><code>oracle_home_directory</code></td>
<td>specifies the Oracle home directory where the gateway resides.</td>
</tr>
<tr>
<td><code>dg4db2</code></td>
<td>specifies the executable name of the Oracle Database Gateway for DRDA.</td>
</tr>
</tbody>
</table>

Note: You must use the same SID value in the `listener.ora` file and the `tnsnames.ora` file that will be configured in the next step.

If you are already running a Oracle Net 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_NAME=gateway_sid)
        (ORACLE_HOME=oracle_home_directory)
        (PROGRAM=dg4db2)
      )
    )
```

See Also: `Oracle Database Net Services Administrator’s Guide` for information about changing the `listener.ora` file.
Stop and Start the Oracle Net Listener for the Gateway

You must stop and restart the Oracle Net Listener to initiate the new settings, as follows:

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

   ```
   $ PATH=$ORACLE_HOME/bin:$PATH;export PATH
   $ LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH; export LD_LIBRARY_PATH
   ```

   If you have the C Shell, enter the following:

   ```
   $ setenv PATH $ORACLE_HOME/bin:$PATH
   $ setenv LD_LIBRARY_PATH $ORACLE_HOME/lib:$LD_LIBRARY_PATH
   ```

   Table 14–1 specifies which parameter value to use for the different platforms:

   **Table 14–1 Parameter Values for UNIX Based Platforms**

<table>
<thead>
<tr>
<th>Platform</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Solaris (SPARC) 64 bit and</td>
<td>LD_LIBRARY_PATH_64=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Oracle Solaris on x86-64 (64-Bit)</td>
<td></td>
</tr>
<tr>
<td>HP-UX Itanium</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>Linux x86 64 bit</td>
<td>LD_LIBRARY_PATH=$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>IBM AIX on POWER Systems (64-Bit)</td>
<td>LIBPATH=$ORACLE_HOME/lib</td>
</tr>
</tbody>
</table>

   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 a partial output from a lsnrctl status check:

   ```
   Listening Endpoints Summary...
   (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=204.179.99.15)(PORT=1551)))
   Services Summary...
   Service "dg4db2" has 1 instance(s).
   Instance "dg4db2", status UNKNOWN, has 1 handler(s) for this service...
   The command completed successfully
   ```

   In this example, the service name is dg4db2, which is the default SID value assigned during installation.

   **Note:** You must use the same SID value in the tnsnames.ora file and the listener.ora file.
Configure Two-Phase Commit

Support for Two-Phase Commit requires running the $ORACLE_HOME/dg4db2/admin/dg4db2_tx.sql script on the DB2 server. This script will create objects used by the gateway for Two-Phase Commit. Edit the script and replace the default recover account schema (RECOVER) with the account name specified for the HS_FDS_RECOVERY_ACCOUNT initialization parameter. Refer to Appendix C, "Initialization Parameters" for more details.

Create Tables and Views for Data Dictionary Support

To enable data dictionary translation support, data dictionary tables and views have to be created on each non-Oracle system that you want to access through the gateway.

Perform the following steps to create the data dictionary tables and views using database native tools:

1. Upgrade from a previous gateway release
   If you are upgrading from a previous version of the gateway then run the appropriate script to drop the old data dictionary definitions.
   - If connecting to DB2 UDB for Linux, Unix, and Windows, then run $ORACLE_HOME/dg4db2/admin/dg4db2_luw_drop.sql
   - If connecting to DB2 UDB for z/OS, then run $ORACLE_HOME/dg4db2/admin/dg4db2_zos_drop.sql
   - If connecting to DB2 UDB for iSeries, then run $ORACLE_HOME/dg4db2/admin/dg4db2_as400_drop.sql

2. Create the data dictionary tables
   Run the appropriate script to create the data dictionary tables.
   - If connecting to DB2 UDB for Linux, Unix, and Windows, then run $ORACLE_HOME/dg4db2/admin/dg4db2_luw_tab.sql
   - If connecting to DB2 UDB for z/OS, then run $ORACLE_HOME/dg4db2/admin/dg4db2_zos_tab.sql
   - If connecting to DB2 UDB for iSeries, then run $ORACLE_HOME/dg4db2/admin/dg4db2_as400_tab.sql

3. Create the data dictionary views
   Run the appropriate script to create the data dictionary views.
   - If connecting to DB2 UDB for Linux, Unix, and Windows, then run
     For DB2 UDB for Linux, Unix, and Windows V7: $ORACLE_HOME/dg4db2/admin/dg4db2_luw_vw7.sql
     For DB2 UDB for Linux, Unix, and Windows V8 and V9: $ORACLE_HOME/dg4db2/admin/dg4db2_luw_vw8.sql
   - If connecting to DB2 UDB for z/OS then run
Configure the Oracle Database for Gateway Access

Before you use the gateway to access DB2 data you must configure the Oracle database to enable communication with the gateway over Oracle Net.

To configure the Oracle database you must add connect descriptors to the tnsnames.ora file. By default, this file is in $ORACLE_HOME/network/admin, where $ORACLE_HOME is the directory in which the Oracle database is installed. You cannot use the Oracle Net Assistant or the Oracle Net Easy Config tools to configure the tnsnames.ora file. You must edit the file manually.

A sample of the tnsnames.ora entry (tnsnames.ora.sample) is available in the $ORACLE_HOME/dg4db2/admin directory where $ORACLE_HOME is the directory under which the gateway is installed.

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

Configuring tnsnames.ora

Edit the tnsnames.ora file to add a connect descriptor for the gateway. The following is the syntax of the Oracle Net entry using the TCP/IP protocol:

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

For DB2 UDB for z/OS V7 (RACF security):
$ORACLE_HOME/dg4db2/admin/dg4db2_zos_vw7r.sql

For DB2 UDB for z/OS V7 (DB2 security):
$ORACLE_HOME/dg4db2/admin/dg4db2_zos_vw7s.sql

For DB2 UDB for z/OS V8 and V9 (RACF security):
$ORACLE_HOME/dg4db2/admin/dg4db2_zos_vw8r.sql

For DB2 UDB for z/OS V8 and V9 (DB2 security):
$ORACLE_HOME/dg4db2/admin/dg4db2_zos_vw8s.sql

If connecting to DB2 UDB for iSeries, then run

For DB2 UDB for iSeries V5.1:
$ORACLE_HOME/dg4db2/admin/dg4db2_as400_vw51.sql

For DB2 UDB for iSeries V5.2:
$ORACLE_HOME/dg4db2/admin/dg4db2_as400_vw52.sql

For DB2 UDB for iSeries V5.3 or higher:
$ORACLE_HOME/dg4db2/admin/dg4db2_as400_vw53.sql
Configure the Oracle Database Gateway for DRDA

Configuring tnsnames.ora for Multiple Listeners

To ensure higher availability, you can specify multiple listeners within the connect descriptor.

```
connect_descriptor=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=host_name_1)
      (PORT=port_number_1)
    )
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=host_name_2)
      (PORT=port_number_2)
    )
    (CONNECT_DATA=
      (SID=gateway_sid)
      (HS=OK)
    )
  )
```

This indicates that, if the listener for `host_name_1` and `port_number_1` is not available, then the second listener for `host_name_2` and `port_number_2` will take over.

**See Also:** Oracle Database Administrator’s Guide for information about editing the tnsnames.ora file.
Create Database Links

Any Oracle client connected to the Oracle database can access DB2 data through the gateway. The Oracle client and the Oracle database can reside on different machines. The gateway accepts connections only from the Oracle database.

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 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 DRDA 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.

To access the DRDA server, you must create a database link. A public database link is the most common of database links.

```
SQL> CREATE PUBLIC DATABASE LINK dblink CONNECT TO
2 "user" IDENTIFIED BY "password" USING 'tns_name_entry';
```

Where:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dblink</td>
<td>is the complete database link name.</td>
</tr>
<tr>
<td>tns_name_entry</td>
<td>specifies the Oracle Net connect descriptor specified in the tnsnames.ora file that identifies the gateway</td>
</tr>
</tbody>
</table>

After the database link is created you can verify the connection to the DRDA database, as follows:

```
SQL> SELECT * FROM DUAL@dblink;
```

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

Configure the Gateway to Access Multiple DRDA Databases

The tasks for configuring the gateway to access multiple DRDA 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 dg4db2
- The `ORACLE_HOME` environment variable is set to the directory where the gateway is installed
- The gateway is configured for one DRDA database named db1
- Two DRDA databases named db2 and db3 on a host with IP Address 204.179.79.15 are being added
Multiple DRDA Databases Example: Configuring the Gateway

Choose One System ID for Each DRDA Database
A separate instance of the gateway is needed for each DRDA database. Each instance needs its own gateway System ID (SID). For this example, the gateway SIDs are chosen for the instances that access the DRDA databases:

- dg4db22 for the gateway accessing database db2
- dg4db23 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/dg4db2/admin/initdg4db2.ora, twice, naming one with the gateway SID for db2 and the other with the gateway SID for db3:

```
$ cd $ORACLE_HOME/dg4db2/admin
$ cp initdg4db2.ora initdg4db22.ora
$ cp initdg4db2.ora initdg4db23.ora
```

Note: If you have multiple gateway SIDs for the same DRDA 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 DRDA Databases Example: Configuring Oracle Net Listener

Add Entries to listener.ora
Add two new entries to the Oracle Net 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=dg4db2} |
| {ORACLE_HOME=oracle_home_directory} |
| {PROGRAM=dg4db2} |
|
| {SID_DESC= |
| {SID_NAME=dg4db22} |
| {ORACLE_HOME=oracle_home_directory} |
| {PROGRAM=dg4db2} |
|
| {SID_DESC= |
| {SID_NAME=dg4db23} |
| {ORACLE_HOME=oracle_home_directory} |
| {PROGRAM=dg4db2} |
|
```

Configuring Oracle Database Gateway for DRDA 14-9
where, oracle_home_directory is the directory where the gateway resides.

**Multiple DRDA Databases Example: Stopping and Starting the Oracle Net 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:

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

**Multiple Databases Example: Configuring Oracle Database for Gateway Access**

**Configuring Oracle Net 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 DRDA example shows the entry for the original installed gateway first, followed by the two entries for the new gateway instances:

```python
old_db_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=port_number)
    (HOST=host_name))
  (CONNECT_DATA=
    (SID=dg4db2)
    (HS=OK)))
new_db2_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=port_number)
    (HOST=host_name))
  (CONNECT_DATA=
    (SID=dg4db22)
    (HS=OK)))
new_db3_using=(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (PORT=port_number)
    (HOST=host_name))
  (CONNECT_DATA=
    (SID=dg4db23)
    (HS=OK)))
```

The value for PORT is the TCP/IP port number of the Oracle Net Listener that is listening for the gateway. The number can be found in the listener.ora file used by the Oracle Net 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 Oracle Net Listener.

**Multiple DRDA Databases Example: Accessing DB2 Data**

Enter the following to create a database link for the dg4db22 gateway:

```sql
SQL> CREATE PUBLIC DATABASE LINK DRDA2 CONNECT TO
  2  "user2" IDENTIFIED BY 'password2' USING 'new_db2_using';
```
Enter the following to create a database link for the dg4db23 gateway:

```
SQL> CREATE PUBLIC DATABASE LINK DRDA3 CONNECT TO
       2  "user3" IDENTIFIED BY "password3" USING 'new_db3_using';
```

After the database links are created, you can verify the connection to the new DRDA databases, as in the following:

```
SQL> SELECT * FROM ALL_USERS@DRDA2;
SQL> SELECT * FROM ALL_USERS@DRDA3;
```
The gateway architecture involves multiple computer setups that have distinct security capabilities and limitations. This chapter provides information for planning and implementing your security system.

It contains the following sections:

- Security Overview
- Authenticating Application Logons
- Defining and Controlling Database Links
- Processing Inbound Connections
- Passwords in the Gateway Initialization File

Security Overview

When you connect several different systems, generally the system with the strictest security requirements dictates and rules the system.

Gateway security involves two groups:

- Users and applications that are permitted access to a given gateway instance and DRDA database server
- Server database objects that users and applications are able to query and update

You can control access in the gateway architecture at several points. Control over database object access is provided by each DRDA database server with `GRANT` and related native authorization mechanisms based on user ID.

When the gateway is involved in a SQL request, security mechanisms are in effect for each DRDA system component encountered by the gateway. The first system component encountered is the application tool or 3GL program. The last system component encountered is the DRDA database.

Authenticating Application Logons

An application must connect to an Oracle database before using the gateway. The type of logon authentication that you use determines the resulting Oracle user ID and can affect gateway operation. There are two basic types of authentication:

- Oracle authentication: With Oracle authentication, each Oracle user ID has a password known to Oracle database. When an application connects to the server, it supplies a user ID and password. Oracle database confirms that the user ID exists and that the password matches the one kept in the database.
Operating system authentication: With operating system authentication, the servers underlying operating system is responsible for authentication. An Oracle user ID that is created with the IDENTIFIED EXTERNALLY attribute, instead of a password, is accessed with operating system authentication. To log into such a user ID, the application supplies a forward slash (/) for a user ID and does not supply a password.

To perform operating system authentication, the server determines the requester’s operating system user ID, optionally adds a fixed prefix to it, and uses the result as the Oracle user ID. The server confirms that the user ID exists and is IDENTIFIED EXTERNALLY, but no password checking is done. The underlying assumption is that users were authenticated when they logged into the operating system.

Operating system authentication is not available on all platforms and is not available in some Oracle Net (client-server) and multi-threaded server configurations. Refer to the database installation guide and Oracle Net documentation to determine the availability of this feature.

For more information about authenticating application logons, refer to the Oracle Database Reference.

Defining and Controlling Database Links

The information here is specific to the gateway. For additional information on database links, refer to the Oracle Database Reference.

Link Accessibility

The database link should be accessible to a given user. A public database link can be used by any user ID. A private database link can be used only by the user who created it. The server makes no distinction regarding the type of use (such as read-only versus update or write) or accessibility of remote objects. The DRDA database, which is accessed, is responsible for these distinctions.

Links and CONNECT Clauses

The CONNECT clause is another security-related attribute of a database link. You can use the CONNECT clause to specify an explicit user ID and password, which can differ from the user’s Oracle database user ID and password. This CONNECT user ID and password combination is sent to the gateway when the database link connection is first opened. Depending on gateway options, the gateway might send that user ID and password to the DRDA Server for validation.

If a database link is created without a CONNECT clause, then the user’s Oracle database user ID and password are sent to the gateway when the connection is opened. If the user logs into the Oracle database with operating system authentication, then the gateway does not receive any user ID or password from the Oracle database. In this case, user ID mapping facilities at the DRDA Server can be used to make such a connection possible if all users on the same host can use the same DRDA database user ID.

Processing Inbound Connections

Current DRDA Servers provide options for manipulating the security conduct of an inbound (client) DRDA session request.
User ID Mapping

The most useful DRDA Server security capability is user ID mapping. User ID mapping refers to changing the user ID associated with an incoming DRDA request to some other user ID known to that server. This is a useful feature if your Oracle Database Gateway installation does not have a uniform user ID structure across all systems and databases.

DB2 UDB for z/OS

The DB2 DDF Communication Database (CDB) stores inbound DRDA session security options.

These tables, pertinent to inbound sessions, have a role in security processing:

- **SYSIBM.IPNAMES table**
  
  The `SYSIBM.IPNAMES` table controls inbound security conducted for TCP/IP based sessions, affecting all DRDA connections from a particular host system. This table also controls whether inbound connection user IDs are subject to translation or mapping.

- **SYSIBM.SYSUSERNAMES table**
  
  When translation is used, rows in the `SYSIBM.SYSUSERNAMES` table specify translated user IDs by IP name and inbound user ID. Default entries that pertain to all IPs and to all inbound user IDs can be made in both tables. The mapping table can also be used simply to indicate which inbound user IDs are permitted from a particular IP or from all IPs, whether or not they are mapped.

  This implementation provides a flexible mapping structure. You can specify that all connections from a particular IP use a single DB2 user ID, or that a particular inbound user ID always be mapped to a particular DB2 user ID regardless of origin. A `SYSUSERNAMES` entry with blank IP name and inbound user ID can designate a single default DB2 user ID for all connections unless a more specific entry, by IP name, user ID, or both, exists.

  The CDB tables can be updated by a user with update privilege using a SQL tool such as the DB2 SPUFI utility. For example, most database administrators, systems programmers, and security officers can update CDB tables. The DB2 DDF component must be stopped and restarted for CDB changes to take effect.

  The DB2 non-DRDA-specific security features are also involved in DRDA connections. User IDs are subject to normal DB2 or SAF/RACF validation in addition to connection or sign-on exit processing. Passwords are also subject to validation. After the connection is established, all normal authorizations or `GRANT` associated with the user ID are in effect. The user ID must have execute privilege on the gateway DRDA package to process any SQL statements.

DB2 UDB for iSeries

DB2 UDB for iSeries does not provide a user ID mapping capability comparable to that in DB2 UDB for z/OS. Normally, the user ID in an incoming DRDA connection request must be a valid user ID on that DB2 UDB for iSeries.

The DB2 UDB for iSeries subsystem communications entry for the gateway should specify that the gateway is not a secure location and should include a default user ID of `*NONE`.

After the application has completed the DRDA connection to the DB2 UDB for iSeries, it is subject to all authorities and `GRANT` associated with the user ID in use.
The user ID must have execute authority on the gateway DRDA package to execute any SQL statements.

**DB2 UDB for Linux, Unix, and Windows**

DB2 UDB for Linux, Unix, and Windows does not provide a user ID mapping capability comparable to that in DB2 UDB for z/OS. Normally, the user ID in an incoming DRDA connection request must be a valid user ID on the DB2 UDB for Linux, Unix, and Windows host.

After the application has completed the DRDA connection to the DB2 host, it is subject to all authorities and GRANTs associated with the user ID in use. The user ID must have execute authority on the gateway DRDA package to execute any SQL statements.

**Passwords in the Gateway Initialization File**

The gateway uses user IDs and passwords to access the information in the remote database on the DRDA Server. Some user IDs 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. An encryption feature has been added as part of Heterogeneous Services’ generic connectivity to help make this more secure. This feature is accessible by this gateway. With it Initialization parameters which contain sensitive values might be stored in an encrypted form. Refer to Section 4.2.3, ‘Encrypting Initialization parameters’ in the *Oracle Database Heterogeneous Connectivity User’s Guide* for more information about how to use the feature.

**See Also:** the parameters `HS_FDS_RECOVERY_ACCOUNT` and `HS_FDS_RECOVERY_PWD` in Appendix C as examples, for more information.
This chapter describes how to migrate to new instances of Oracle Database Gateway for DRDA from an existing installation. Perform the following steps to migrate to a new release of Oracle Database Gateway for DRDA from an existing release:

1. Install the New Release
2. Gateway Initialization Parameter File
3. Bind Gateway Package
4. Install or Upgrade Data Dictionary Views

Install the New Release

Install the new release of the gateway in a separate directory, as discussed Chapter 12, "Installing Oracle Database Gateway for DRDA".

Caution: Do not install the gateway over a previously existing gateway installation. This corrupts the existing installation.

Gateway Initialization Parameter File

This release of Database Gateway for DRDA has a completely new architecture. Most of the prior parameters are obsolete. You should not use the old initialization file as a base and try to modify it. Instead, you should use the new initialization generated as part of installation as a base. Refer to Appendix C, "Initialization Parameters" for the syntax of the parameters.

Existing TG4DB2 customer migrating to this release of Database Gateway for DRDA would need to provide the recovery user’s password HS_FDS_RECOVERY_PWD, with this release of gateway.

Bind Gateway Package

The binding of the package is automatic. Refer to Chapter 13, "Configuring the DRDA Server".

Install or Upgrade Data Dictionary Views

For the correct functioning of the gateway, the data dictionary views must be installed on any DB2 system that will be accessed by the gateway. If you are upgrading the gateway, then you must replace the data dictionary views to the ones shipped with the
latest gateway. The new views are required for the correct functioning of the latest version of the gateway. They contain necessary backward functionality to be compatible with the previous versions. Refer to Chapter 14, "Configuring Oracle Database Gateway for DRDA" for more information on creating data dictionary views.
Part VIII, "Removing Oracle Database Gateway" describes how to remove Oracle Database Gateway.

It contains the following chapter:

- Chapter 17, "Removing Oracle Database Gateway"
This chapter describes how to remove Oracle Database Gateway from an Oracle home directory. It contains information about the following topics:

- **About the Deinstallation Tool**
- **Removing Oracle Software**

**About the Deinstallation Tool**

The Deinstallation Tool (deinstall) is available in the installation media before installation, and is available in Oracle home directories after installation. It is located in the path `$ORACLE_HOME/deinstall`.

The deinstall command stops Oracle software, and removes Oracle software and configuration files on the operating system.

The command uses the following syntax, where variable content is indicated by italics:

```
deinstall -home complete path of Oracle home [-silent] [-checkonly] [-local] [-paramfile complete path of input parameter property file] [-params name1=value name2=value ...] [-o complete path of directory for saving files] [-help | -h]
```

The options are:

- **-silent**

  Use this flag to run the command in silent or response file mode. If you use the -silent flag, then you must use the -paramfile flag, and provide a parameter file that contains the configuration values for the Oracle home that you want to deinstall or deconfigure.

  You can generate a parameter file to use or modify by running deinstall with the -checkonly flag. The deinstall command then discovers information from the Oracle home that you want to deinstall and deconfigure. It generates the properties file, which you can then use with the -silent option.

  You can also modify the template file deinstall.rsp.tmpl, located in the response folder.

- **-checkonly**

  Use this flag to check the status of the Oracle software home configuration. Running the command with the -checkonly flag does not remove the Oracle configuration. The -checkonly flag generates a parameter file that you can use with the deinstall command.

- **-local**
Use this flag on a multinode environment to deconfigure Oracle software in a cluster.

When you run deconfig with this flag, it deconfigures and deinstalls the Oracle software on the local node (the node where deconfig is run). On remote nodes, it deconfigures Oracle software, but does not deinstall the Oracle software.

- **-paramfile complete path of input parameter property file**
  Use this flag to run deconfig with a parameter file in a location other than the default. When you use this flag, provide the complete path where the parameter file is located.

  The default location of the parameter file depends on the location of deconfig:
  - From the installation media or stage location: $ORACLE_HOME/inventory/response
  - From a unzipped archive file from OTN: /ziplocation/response
  - After installation from the installed Oracle home: $ORACLE_HOME/deinstall/response

- **-params [name1=value name 2=value name3=value . . .]**
  Use this flag with a parameter file to override one or more values that you want to change in a parameter file you have already created.

- **-o complete path of directory for saving response files**
  Use this flag to provide a path other than the default location where the properties file (deinstall.rsp.tmpl) is saved.

  The default location of the parameter file depends on the location of deconfig:
  - From the installation media or stage location before installation: $ORACLE_HOME/
  - From a unzipped archive file from OTN: /ziplocation/response/
  - After installation from the installed Oracle home: $ORACLE_HOME/deinstall/response

- **-help | -h**
  Use the help option (-help or -h) to obtain additional information about the command option flags.

---

**Removing Oracle Software**

Complete the following procedure to remove Oracle software:

1. Log in as the installation owner.
2. Run the deinstall command, providing information about your servers as prompted.
Part IX, "Appendixes" includes appendixes containing information relevant to installing and configuring Oracle Database Gateways.

It contains the following chapters:

- Appendix A, "Using Response Files for Noninteractive Installation"
- Appendix B, "Oracle Database Gateway Troubleshooting"
- Appendix C, "Initialization Parameters"
- Appendix D, "Configuration Worksheet for DRDA"
Using Response Files for Noninteractive Installation

This appendix describes how to install and configure Oracle products using response files. It includes the following topics:

- Introduction
- Creating the oraInst.loc File
- Preparing a Response File
- Running Oracle Universal Installer in Silent or Suppressed Mode

Introduction

You can automate the installation and configuration of Oracle software, either fully or partially, by specifying a response file when you start Oracle Universal Installer. Oracle Universal Installer uses the values contained in the response file to provide answers to some or all of Oracle Universal Installer prompts:

- If you include responses for all of the prompts in the response file and specify the -silent option when starting Oracle Universal Installer, then Oracle Universal Installer runs in silent mode. During a silent-mode installation, Oracle Universal Installer does not display any screens. Instead, it displays progress information in the terminal that you used to start it.

- If you include responses for some or all of the prompts in the response file and omit the -silent option, then Oracle Universal Installer runs in suppressed mode. During a suppressed-mode installation, Oracle Universal Installer displays only the screens for which you did not specify all required information. You can also use variables in the response file or command-line options to suppress other installer screens, such as the Welcome screen or Summary screen, that do not prompt for information.

The following table describes several reasons why you might want to run Oracle Universal Installer in silent mode or suppressed mode:
Creating the oraInst.loc File

**Installation Overview**

To install and configure Oracle products using Oracle Universal Installer in silent or suppressed mode, follow these steps:

1. Create the `oraInst.loc` file.
2. Prepare a response file.
3. Run Oracle Universal Installer in silent or suppressed mode.

These steps are described in the following sections.

### Creating the oraInst.loc File

If you plan to install Oracle products using Oracle Universal Installer in silent or suppressed mode, you must manually create the `oraInst.loc` file if it does not already exist. This file specifies the location of the Oracle Inventory directory where Oracle Universal Installer creates the inventory of Oracle products installed on the system.

**Note:** If Oracle software has been installed previously on the system, the `oraInst.loc` file might already exist. If the file does exist, you do not need to create a file.

To create the `oraInst.loc` file, follow these steps:

1. Switch user to root:

2. On Solaris (SPARC), create the `/var/opt/oracle` directory if it does not exist:
   
   ```sh
   # mkdir /var/opt/oracle
   ```

3. Change directory as follows, depending on your operating system:

   **AIX:**
   
   ```sh
   # cd /etc
   ```

   **Silent**
   
   Use silent mode if you want to:
   - Complete an unattended installation, which you might schedule using operating system utilities such as `at`.
   - Complete several similar installations on multiple systems without user interaction.
   - Install the software on a system that does not have X Window System software installed on it.

   Oracle Universal Installer displays progress information in the terminal that you used to start it, but it does not display any of Oracle Universal Installer screens.

   **Suppressed**
   
   Use suppressed mode if you want to complete similar Oracle software installations on more than one system, providing default answers to some, but not all of Oracle Universal Installer prompts.

   If you do not specify information required for a particular Installer screen in the response file, Oracle Universal Installer displays that screen. It suppresses screens for which you have provided all of the required information.
Preparing a Response File

This section describes the methods that you can use to prepare a response file for use during silent-mode or suppressed-mode installations:

- Editing a Response File Template
- Recording a Response File

Editing a Response File Template

Oracle provides response file templates for each product and installation type, and for each configuration tool. The response files for Oracle Gateways, `tg.rsp` and `netca.rsp` are located in the `response` directory on the media.

**Note:** If you copied the software to a hard disk, the response files are located in the `Disk1/response` directory.

To prepare a response file:

1. Copy the response file from the response file directory to a directory on your system:

   ```bash
   $ cp /directory_path/response/response_file.rsp local_directory
   ```

   In this example, `directory_path` is the CD-ROM mount point directory or the directory on the DVD. If you have copied the software to a hard drive, you can edit the file in the `response` directory if you prefer.

2. Open the response file in a text editor:

   ```bash
   $ vi /local_dir/response_file.rsp
   ```

3. Edit the file, following the instructions in the file.

   **Note:** Oracle Universal Installer or configuration assistant fails if you do not correctly configure the response file. Refer to the "Silent-Mode Response File Error Handling" section on page B-3 for more information about troubleshooting a failed silent-mode installation.

4. Change the permissions on the file to 700:

   ```bash
   $ chmod 700 /local_dir/response_file.rsp
   ```

Recording a Response File

This method is most useful for Custom or software-only installations.
You can use Oracle Universal Installer in interactive mode to record a response file that you can edit and then use to complete silent-mode or suppressed-mode installations. When you are recording the response file, you can either complete the installation, or you can exit from Oracle Universal Installer on the Summary page, before it starts to copy the software to the system.

To record a new response file:

1. Complete the pre-installation tasks listed in respective chapters.
   - When you run Oracle Universal Installer to record a response file, it checks the system to verify that it meets the requirements to install the software. For this reason, Oracle recommends that you complete all of the required pre-installation tasks and record the response file while completing an installation.

2. If you have not installed Oracle software on this system previously, create the `oraInst.loc` file, as described in the previous section.

3. Ensure that the Oracle software owner user (typically `oracle`) has permissions to create or write to the Oracle home path that you will specify when you run Oracle Universal Installer.

4. To record a response file, enter a command similar to the following to start Oracle Universal Installer:
   ```
   $ /directory_path/runInstaller -record -destinationFile filename
   ```
   In the previous example:
   - `directory_path` is either the CD-ROM mount point directory, the path of the directory on the DVD, or the path of the `Disk1` directory on the hard drive
   - The `-record` parameter specifies that you want to record the responses that you enter in a response file
   - `filename` is the full path and file name of the response file that you want to record

5. On each Installer screen, specify the required information.

6. When Oracle Universal Installer displays the Summary screen, do one of the following:
   - Click **Install** to create the response file, then continue with the installation.
   - Click **Cancel**, then **Yes** to create the response file but exit from Oracle Universal Installer without installing the software.
   - The response file is saved in the location that you specified using the `-destinationFile` option.

7. If you did not complete the installation, delete the Oracle home directory that Oracle Universal Installer created using the path you specified on the Specify File Locations screen.

8. Before using the recorded response file on another system, use a text editor to edit the file and make any required changes.
   - Use the comments in the file as a guide when editing it.
Running Oracle Universal Installer in Silent or Suppressed Mode

To run Oracle Universal Installer in silent or suppressed mode, follow these steps:

1. Complete the pre-installation tasks listed in the respective chapters.
2. Log in as the Oracle software owner user (typically `oracle`).
3. To start Oracle Universal Installer in silent or suppressed mode, enter a command similar to the following:

   ```bash
   $ /directory_path/runInstaller -silent -noconfig -responseFile filename
   ```

   In this example:
   - `directory_path` is either the installation media mount point directory, the path of the directory on the DVD, or the path of the `Disk1` directory on the hard drive.
   - `-silent` indicates that you want to run Oracle Universal Installer in silent mode.
   - `-noconfig` suppresses running the configuration assistants during installation, and a software-only installation is performed instead.
   - `filename` is the full path and file name of the installation response file that you configured.

   **Note:** Do not specify a relative path to the response file. If you specify a relative path, Oracle Universal Installer fails.

   **Note:** For more information about other options for the `runInstaller` command, enter the following command:

   ```bash
   $ /directory_path/runInstaller -help
   ```
This appendix contains information about troubleshooting. It includes the following topics:

- Verify Requirements
- What to Do if an Installation Error Occurs
- Reviewing the Log of an Installation Session
- Troubleshooting Configuration Assistants
- Silent-Mode Response File Error Handling
- Cleaning Up After a Failed Installation

Verify Requirements

Before performing any of the troubleshooting steps in this appendix, ensure that the system meets the requirements and that you have completed all of the pre-installation tasks specified in respective chapters.

Read the Release Notes

Read the release notes for the product before installing it. The latest version of the release notes is also available on the OTN Web site:

http://docs.oracle.com

What to Do if an Installation Error Occurs

If you encounter an error during installation:

- Do not exit Oracle Universal Installer.
- If you clicked Next after you entered incorrect information about one of the installation screens, then click Back to return to the screen and correct the information.
- If you encounter an error while Oracle Universal Installer is copying or linking files, see the "Reviewing the Log of an Installation Session" section on page B-2.
- If you encounter an error while a configuration assistant is running, see the "Troubleshooting Configuration Assistants" section on page B-2.
- If you cannot resolve the problem, then remove the failed installation by following the steps listed in the "Cleaning Up After a Failed Installation" section on page B-3.
Reviewing the Log of an Installation Session

During an installation, Oracle Universal Installer records all the actions that it performs, in a log file. If you encounter problems during the installation, then review the log file for information about possible causes of the problem.

To view the log file, follow these steps:

1. If necessary, enter the following command to determine the location of the oraInventory directory:

   For AIX and Linux:
   
   ```
   $ cat /etc/oraInst.loc
   ```

   For Solaris SPARC:
   
   ```
   # more /var/opt/oracle/oraInst.loc
   ```

   The inventory_loc parameter in this file specifies the location of the oraInventory directory.

2. Enter the following command to change directory to Oracle Universal Installer log file directory, where orainventory_location is the location of the oraInventory directory:

   ```
   $ cd /orainventory_location/logs
   ```

3. Enter the following command to determine the name of the log file:

   ```
   $ ls -ltr
   ```

   This command lists the files in the order of creation, with the most recent file shown last. Installer log files have names similar to the following, where date_time indicates the date and time that the installation started:

   ```
   installActionsdate_time.log
   ```

4. To view the most recent entries in the log file, where information about a problem is most likely to appear, enter a command similar to the following:

   ```
   $ tail -50 installActionsdate_time.log | more
   ```

   This command displays the last 50 lines in the log file.

5. If the error displayed by Oracle Universal Installer or listed in the log file indicates a relinking problem, refer to the following file for more information:

   ```
   $ORACLE_HOME/install/make.log
   ```

Troubleshooting Configuration Assistants

To troubleshoot an installation error that occurs when a configuration assistant is running:

- Review the installation log files listed in the "Reviewing the Log of an Installation Session” section on page B-2.
- Review the specific configuration assistant log file located in the $ORACLE_HOME/cfgtoollogs directory. Try to fix the issue that caused the error.
If you see the "Fatal Error. Reinstall" message, look for the cause of the problem by reviewing the log files. Refer to the "Fatal Errors" section on page B-3 for further instructions.

**Configuration Assistant Failure**

Oracle configuration assistant failures are noted at the bottom of the installation screen. The configuration assistant interface displays additional information, if available. The configuration assistant execution status is stored in the following file:

```
oraInventory_location/logs/installActions<date_time>.log
```

The execution status codes are listed in the following table:

<table>
<thead>
<tr>
<th>Status</th>
<th>Result Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration assistant succeeded</td>
<td>0</td>
</tr>
<tr>
<td>Configuration assistant failed</td>
<td>1</td>
</tr>
<tr>
<td>Configuration assistant cancelled</td>
<td>-1</td>
</tr>
</tbody>
</table>

**Fatal Errors**

If you receive a fatal error while a configuration assistant is running then:

1. Remove the failed installation as described in the "Cleaning Up After a Failed Installation" section on page B-3.
2. Correct the cause of the fatal error.
3. Reinstall the Oracle software.

**Silent-Mode Response File Error Handling**

To determine whether a silent-mode installation succeeds or fails, refer to the following log file:

```
/oraInventory_location/logs/silentInstall<date_time>.log
```

If necessary, refer to the previous section for information about determining the location of the `oraInventory` directory.

A silent installation fails if:

- You do not specify a response file
- You specify an incorrect or incomplete response file
- Oracle Universal Installer encounters an error, such as insufficient disk space

Oracle Universal Installer or configuration assistant validates the response file at runtime. If the validation fails, then the silent-mode installation or configuration process ends. Oracle Universal Installer treats values for parameters that are of the wrong context, format, or type as if no value was specified in the file.

**Cleaning Up After a Failed Installation**

If an installation fails, you must remove files that Oracle Universal Installer created during the attempted installation and remove the Oracle home directory. Perform the following steps to remove the files:
1. Start Oracle Universal Installer as described in the "Running the Oracle Universal Installer" section on page 1-5.

2. Click Deinstall Products on the Welcome window or click Installed Products on any Installer window. The Inventory window appears, listing installed products.

3. Select the Oracle home that contains the products that you want to remove, then click Remove.

4. Manually remove the Oracle home directory created during the failed installation.

5. Reinstall the Oracle software.
The Oracle database initialization parameters in the init.ora file are distinct from gateway initialization parameters. Set the gateway parameters in the initialization parameter file using an agent-specific mechanism, or set them in the Oracle data dictionary using the DBMS_HS package. The gateway initialization parameter file must be available when the gateway is started. Changes made to the initialization parameters only take effect in the next gateway session.

This appendix contains a list of the gateway initialization parameters that can be set for each gateway and their description. It also describes the initialization parameter file syntax. It includes the following sections:

- Initialization Parameter File Syntax
- Oracle Database Gateway for Sybase Initialization Parameters
- Oracle Database Gateway for Informix Initialization Parameters
- Oracle Database Gateway for Teradata Initialization Parameters
- Oracle Database Gateway for SQL Server Initialization Parameters
- Oracle Database Gateway for ODBC Initialization Parameters
- Oracle Database Gateway for DRDA Initialization Parameters
- Initialization Parameter Descriptions

**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. If there is a syntax error in an initialization parameter file, none of the settings take effect.
5. Set the parameter values as follows:

   `[SET] [PRIVATE] parameter=value`

   Where:
**parameter** is an initialization parameter name. It is a string of characters starting with a letter and consisting of letters, digits and underscores. Initialization parameter names are case sensitive.

**value** is the initialization parameter value. It is case-sensitive. 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.

For example, to enable tracing for an agent, set the **HS_FDS_TRACE_LEVEL** initialization parameter as follows:

```
HS_FDS_TRACE_LEVEL=ON
```

**SET** and **PRIVATE** are optional keywords. You cannot use either as an initialization parameter name. Most parameters are needed only as initialization parameters, so you usually do not need to use the **SET** or **PRIVATE** keywords. If you do not specify either **SET** or **PRIVATE**, the parameter is used only as an initialization parameter for the agent.

**SET** specifies that, in addition to being used as an initialization parameter, the parameter value is set as an environment variable for the agent process. Use **SET** for parameter values that the drivers or non-Oracle system need as environment variables.

**PRIVATE** specifies that the initialization parameter should be private to the agent and should not be uploaded to the Oracle database. Most initialization parameters should not be private. If, however, you are storing sensitive information 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 the initialization parameters private prevents the upload from happening and they do not appear in dynamic performance views. Use **PRIVATE** for the initialization parameters only if the parameter value includes sensitive information such as a user name or password.

**SET PRIVATE** specifies that the parameter value is set as an environment variable for the agent process and is also private (not transferred to the Oracle database, not appearing in dynamic performance views or graphical user interfaces).

---

**Oracle Database Gateway for Sybase Initialization Parameters**

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for Sybase. They are as follows:

- **HS_CALL_NAME**
Oracle Database Gateway for Informix Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for Informix. They are as follows:

- **HS_DB_DOMAIN**
- **HS_DB_INTERNAL_NAME**
- **HS_DB_NAME**
- **HS_DESCRIBE_CACHE_HWM**
- **HS_LANGUAGE**
- **HS_LONG_PIECE_TRANSFER_SIZE**
- **HS_OPEN_CURSORS**
- **HS_RPC_FETCH_REBLOCKING**
- **HS_RPC_FETCH_SIZE**
- **HS_TIME_ZONE**
- **HS_TRANSACTION_MODEL**
- **IFILE**
- **HS_FDS_TIMESTAMP_MAPPING**
- **HS_FDS_DATE_MAPPING**
- **HS_FDS_ARRAY_EXEC**
- **HS_FDS_CONNECT_INFO**
- **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_FETCH_ROWS**
- **HS_FDS_QUOTE_IDENTIFIER**
- **HS_IDLE_TIMEOUT**
- **HS_NLS_LENGTH_SEMANTICS**
- **HS_KEEP_REMOTE_COLUMN_SIZE**
- **HS_FDS_REMOTE_DB_CHARSET**
- **HS_FDS_SUPPORT_STATISTICS**
- **HS_FDS_RSET_RETURN_ROWCOUNT**
- **HS_FDS_SQLLEN_INTERPRETATION**
- **HS_FDS_REPORT_REAL_AS_DOUBLE**
Oracle Database Gateway for Teradata Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for Teradata. They are as follows:

- HS_DB_DOMAIN
- HS_DB_INTERNAL_NAME
- HS_DB_NAME
- HS_DESCRIBE_CACHE_HWM
- HS_LANGUAGE
- HS_LONG_PIECE_TRANSFER_SIZE
- HS_OPEN_CURSORS
- HS_RPC_FETCH_REBLOCKING
- HS_RPC_FETCH_SIZE
- HS_TIME_ZONE
- HS_TRANSACTION_MODEL
- IFILE
- HS_FDS_TIMESTAMP_MAPPING
- HS_FDS_DATE_MAPPING
- HS_FDS_ARRAY_EXEC
- HS_FDS_CONNECT_INFO
- HS_FDS_RECOVERY_ACCOUNT
- HS_FDS_RECOVERY_PWD
- HS_FDS_TRACE_LEVEL
- HS_FDS_TRANSACTION_LOG
- HS_FDS_FETCH_ROWS
- HS_IDLE_TIMEOUT
- HS_NLS_LENGTH_SEMANTICS
- HS_KEEP_REMOTE_COLUMN_SIZE
- HS_FDS_REMOTE_DB_CHARSET
- HS_FDS_SUPPORT_STATISTICS
- HS_FDS_SQLLEN_INTERPRETATION

Oracle Database Gateway for Teradata Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for Teradata. They are as follows:

- HS_DB_DOMAIN
- HS_DB_INTERNAL_NAME
- HS_DB_NAME
- HS_DESCRIBE_CACHE_HWM
- HS_LANGUAGE
- HS_LONG_PIECE_TRANSFER_SIZE
- HS_OPEN_CURSORS
Oracle Database Gateway for SQL Server Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for SQL Server. They are as follows:

- HS_CALL_NAME
- HS_DB_DOMAIN
- HS_DB_INTERNAL_NAME
- HS_DB_NAME
- HS_DESCRIBE_CACHE_HWM
- HS_LANGUAGE
- HS_LONG PIECE_TRANSFER_SIZE
- HS_OPEN_CURSORS
- HS_RPC_FETCH_REBLOCKING
- HS_RPC_FETCH_SIZE
- HS_TIME_ZONE
- HS_TRANSACTION_MODEL
- IFILE
- HS_FDS_CONNECT_INFO

Oracle Database Gateway for SQL Server Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for SQL Server. They are as follows:

- HS_CALL_NAME
- HS_DB_DOMAIN
- HS_DB_INTERNAL_NAME
- HS_DB_NAME
- HS_DESCRIBE_CACHE_HWM
- HS_LANGUAGE
- HS_LONG PIECE_TRANSFER_SIZE
- HS_OPEN_CURSORS
- HS_RPC_FETCH_REBLOCKING
- HS_RPC_FETCH_SIZE
- HS_TIME_ZONE
- HS_TRANSACTION_MODEL
- IFILE
- HS_FDS_CONNECT_INFO
Oracle Database Gateway for ODBC Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for ODBC. They are as follows:

- HS_DB_DOMAIN
- HS_DB_INTERNAL_NAME
- HS_DB_NAME
- HS_DESCRIBE_CACHE_HWM
- HS_LANGUAGE
- HS_LONG PIECE TRANSFER SIZE
- HS_OPEN_CURSORS
- HS_RPC_FETCH_REBLOCKING
- HS_RPC_FETCH_SIZE
- HS_FDS_SHAREABLE_NAME
- HS_TIME_ZONE
- IFILE
- HS_FDS_TIMESTAMP_MAPPING
- HS_FDS_DATE_MAPPING
- HS_FDS_ARRAY_EXEC
Oracle Database Gateway for DRDA Initialization Parameters

This section lists all the initialization file parameters that can be set for the Oracle Database Gateway for DRDA. They are as follows:

- HS_CALL_NAME
- HS_DB_DOMAIN
- HS_DB_INTERNAL_NAME
- HS_DB_NAME
- HS_DESCRIBE_CACHE_HWM
- HS_LANGUAGE
- HS_LONG_PIECE_TRANSFER_SIZE
- HS_OPEN_CURSORS
- HS_RPC_FETCH_REBLOCKING
- HS_RPC_FETCH_SIZE
- HS_TRANSACTION_MODEL
- IFILE
- HS_FDS_DATE_MAPPING
- HS_FDS_ARRAY_EXEC
- HS_FDS_CONNECT_INFO
- HS_FDS_RECOVERY_ACCOUNT
- HS_FDS_RECOVERY_PWD
- HS_FDS_FETCH_ROWS
- HS_FDS_TRACE_LEVEL
- HS_FDS_TRANSACTION_LOG
- HS_IDLE_TIMEOUT
- HS_FDS_MBCS_TO_GRAPHIC
- HS_FDS_GRAPHIC_TO_MBCS
- HS_FDS_TIMESTAMP_MAPPING
- HS_FDS_QUOTE_IDENTIFIER
- HS_FDS_CAPABILITY
Initialization Parameter Description

The following sections describe all the initialization file parameters that can be set for gateways.

**HS_TIME_ZONE**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value for ([+</td>
<td>-]hh:mm)'</td>
</tr>
<tr>
<td>Range of values for ([+</td>
<td>-]hh:mm)'</td>
</tr>
</tbody>
</table>

Specifies the default local time zone displacement for the current SQL session. The format mask, \([+|-]hh:mm\), is specified to indicate the hours and minutes before or after UTC (Coordinated Universal Time—formerly Greenwich Mean Time). For example:

```
HS_TIME_ZONE = [+ | -] hh:mm
```

**HS_FDS_PROC_IS_FUNC**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
<tr>
<td>Range of Values</td>
<td>TRUE, FALSE</td>
</tr>
</tbody>
</table>

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

**HS_FDS_RESULTSET_SUPPORT**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
<tr>
<td>Range of Values</td>
<td>TRUE, FALSE</td>
</tr>
</tbody>
</table>

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 change the syntax of the procedure execute statement for all existing stored procedures to handle return values.

**HS_FDS_SHAREABLE_NAME**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>None</td>
</tr>
<tr>
<td>Range of Values</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Specifies the full path name to the ODBC driver manager.

This is a required parameter, whose format is:

```
HS_FDS_SHAREABLE_NAME=odbc_installation_path/lib/libodbc.sl
```

Where:

- `odbc_installation_path` is the path where the ODBC driver is installed.

**HS_FDS_REPORT_REAL_AS_DOUBLE**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
<tr>
<td>Range of Values</td>
<td>TRUE, FALSE</td>
</tr>
</tbody>
</table>

Enables Oracle Database Gateway for SQL Server, Oracle Database Gateway for ODBC, and Oracle Database Gateway for Sybase treat `SINGLE FLOAT PRECISION` fields as `DOUBLE FLOAT PRECISION` fields.
### HS_CALL_NAME

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>None</td>
</tr>
<tr>
<td>Range of values</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Specifies the remote functions that can be referenced in SQL statements. The value is a list of remote functions and their owners, separated by semicolons, in the following format:

```
owner_name.function_name
```

For example:

```
owner1.A1;owner2.A2;owner3.A3
```

If an owner name is not specified for a remote function, the default owner name becomes the user name used to connect to the remote database (specified when the Heterogeneous Services database link is created or taken from user session if not specified in the DB link).

The entries for the owner names and the function names are case-sensitive.

### HS_DB_DOMAIN

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>WORLD</td>
</tr>
<tr>
<td>Range of values</td>
<td>1 to 199 characters</td>
</tr>
</tbody>
</table>

Specifies a unique network sub-address for a non-Oracle system. The HS_DB_DOMAIN initialization parameter is similar to the DB_DOMAIN initialization parameter, described in the Oracle Database Reference. The HS_DB_DOMAIN initialization parameter is required if you use the Oracle Names server. The HS_DB_NAME and HS_DB_DOMAIN initialization parameters define the global name of the non-Oracle system.

**Note:** The HS_DB_NAME and HS_DB_DOMAIN initialization parameters must combine to form a unique address in a cooperative server environment.

### HS_DB_INTERNAL_NAME

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>01010101</td>
</tr>
<tr>
<td>Range of values</td>
<td>1 to 16 hexadecimal characters</td>
</tr>
</tbody>
</table>

Specifies a unique hexadecimal number identifying the instance to which the Heterogeneous Services agent is connected. This parameter’s value is used as part of a transaction ID when global name services are activated. Specifying a nonunique number can cause problems when two-phase commit recovery actions are necessary for a transaction.
**HS_DB_NAME**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>HO</td>
</tr>
<tr>
<td>Range of values</td>
<td>1 to 8 characters</td>
</tr>
</tbody>
</table>

Specifies a unique alphanumeric name for the data store given to the non-Oracle system. This name identifies the non-Oracle system within the cooperative server environment. The `HS_DB_NAME` and `HS_DB_DOMAIN` initialization parameters define the global name of the non-Oracle system.

**HS_DESCRIBE_CACHE_HWM**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>100</td>
</tr>
<tr>
<td>Range of values</td>
<td>1 to 4000</td>
</tr>
</tbody>
</table>

Specifies the maximum number of entries in the describe cache used by Heterogeneous Services. This limit is known as the describe cache high water mark. The cache contains descriptions of the mapped tables that Heterogeneous Services reuses so that it does not have to re-access the non-Oracle data store.

If you are accessing many mapped tables, increase the high water mark to improve performance. Increasing the high water mark improves performance at the cost of memory usage.

**HS_LANGUAGE**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>System-specific</td>
</tr>
<tr>
<td>Range of values</td>
<td>Any valid language name (up to 255 characters)</td>
</tr>
</tbody>
</table>

Provides Heterogeneous Services with character set, language, and territory information of the non-Oracle data source. The value must use the following format:

`language[_territory.character_set]`

---

**Note:** The globalization support initialization parameters affect error messages, the data for the SQL Service, and parameters in distributed external procedures.

---

**Character Sets**

Ideally, the character sets of the Oracle database and the non-Oracle data source are the same. In almost all cases, `HS_LANGUAGE` should be set exactly the same as Oracle database character set for optimal character set mapping and performance. If they are not the same, Heterogeneous Services attempts to translate the character set of the non-Oracle data source to the Oracle database character set, and back again. The
translation can degrade performance. In some cases, Heterogeneous Services cannot translate a character from one character set to another.

---

**Note:** The specified character set must be a superset of the operating system character set on the platform where the agent is installed.

As more Oracle databases and non-Oracle databases use Unicode as database character sets, it is preferable to also run the gateway in Unicode character set. To do so, you must set `HS_LANGUAGE=AL32UTF8`. However, when the gateway runs on Windows, the Microsoft ODBC Driver Manager interface can exchange data only in the double-byte character set, UCS2. This results in extra ratio expansion of described buffer and column sizes. Refer to `HS_FDS_REMOTE_DB_CHARSET` for instruction on how to adjust to correct sizes.

**Language**
The language component of the `HS_LANGUAGE` initialization parameter determines:

- Day and month names of dates
- AD, BC, PM, and AM symbols for date and time
- Default sorting mechanism

Note that Oracle does not determine the language for error messages for the generic Heterogeneous Services messages (ORA-25000 through ORA-28000). These are controlled by the session settings in the Oracle database.

**Territory**
The territory clause specifies the conventions for day and week numbering, default date format, decimal character and group separator, and ISO and local currency symbols. Note that the level of globalization support between the Oracle database and the non-Oracle data source depends on how the gateway is implemented.

---

**Note:** The parameter is also used to indicate corresponding DB2 target set for Oracle Database Gateway for DRDA.

---

**HS_LONG_PIECE_TRANSFER_SIZE**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>64 KB</td>
</tr>
<tr>
<td>Range of values</td>
<td>Any value up to 2 GB</td>
</tr>
</tbody>
</table>

Sets the size of the piece of `LONG` data being transferred. A smaller piece size means less memory requirement, but more round-trips to fetch all the data. A larger piece size means fewer round-trips, but more of a memory requirement to store the intermediate pieces internally. Thus, the initialization parameter can be used to tune a system for the best performance, with the best trade-off between round-trips and memory requirements, and network latency or response time.
HS_OPEN_CURSORS

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>50</td>
</tr>
<tr>
<td>Range of values</td>
<td>1 to the value of OPEN_CURSORS initialization parameter of Oracle database</td>
</tr>
</tbody>
</table>

Defines the maximum number of cursors that can be open on one connection to a non-Oracle system instance.

The value never exceeds the number of open cursors in the Oracle database. Therefore, setting the same value as the OPEN_CURSORS initialization parameter in the Oracle database is recommended.

HS_RPC_FETCH_REBLOCKING

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>ON</td>
</tr>
<tr>
<td>Range of values</td>
<td>OFF or ON</td>
</tr>
</tbody>
</table>

Controls whether Heterogeneous Services attempts to optimize performance of data transfer between the Oracle database and the Heterogeneous Services agent connected to the non-Oracle data store.

The following values are possible:

- OFF disables reblocking of fetched data so that data is immediately sent from agent to server.
- ON enables reblocking, which means that data fetched from the non-Oracle system is buffered in the agent and is not sent to the Oracle database until the amount of fetched data is equal to or higher than the value of HS_RPC_FETCH_SIZE initialization parameter. However, any buffered data is returned immediately when a fetch indicates that no more data exists or when the non-Oracle system reports an error.

HS_RPC_FETCH_SIZE

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>50000</td>
</tr>
<tr>
<td>Range of values</td>
<td>1 to 10000000</td>
</tr>
</tbody>
</table>

Tunes internal data buffering to optimize the data transfer rate between the server and the agent process.

Increasing the value can reduce the number of network round-trips needed to transfer a given amount of data, but also tends to increase data bandwidth and to reduce latency as measured between issuing a query and completion of all fetches for the query. Nevertheless, increasing the fetch size can increase latency for the initial fetch results of a query, because the first fetch results are not transmitted until additional data is available.
**HS_TRANSACTION_MODEL**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>COMMIT_CONFIRM</td>
</tr>
<tr>
<td>Range of Values</td>
<td>COMMIT_CONFIRM, READ_ONLY, READ_ONLY_AUTOCOMMIT, SINGLE_SITE, SINGLE_SITE_AUTOCOMMIT</td>
</tr>
</tbody>
</table>

Specifies the type of transaction model that is used when the non-Oracle database is updated by a transaction.

The following values are possible:

- **COMMIT_CONFIRM** provides read and write access to the non-Oracle 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 non-Oracle 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.

**COMMIT_CONFIRM** does not apply to Oracle Database Gateway for ODBC. The default value for Oracle Database Gateway for ODBC is **SINGLE_SITE**.

- **READ_ONLY** provides read access to the non-Oracle database.

- **READ_ONLY_AUTOCOMMIT** provides read access to the non-Oracle database that do not have logging. **READ_ONLY_AUTOCOMMIT** does not apply to Oracle Database Gateway for ODBC.

- **SINGLE_SITE** provides read and write access to the non-Oracle database. However, the gateway cannot participate in distributed updates.

- **SINGLE_SITE_AUTOCOMMIT** provides read and write access to the non-Oracle database which do not have logging. Any update is committed immediately, and the gateway cannot participate in distributed updates. **SINGLE_SITE_AUTOCOMMIT** does not apply to Oracle Database Gateway for ODBC.

**IFILE**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default value</td>
<td>None</td>
</tr>
<tr>
<td>Range of values</td>
<td>Valid parameter file names</td>
</tr>
</tbody>
</table>

Use the **IFILE** initialization parameter to embed another initialization file within the current initialization file. The value should be an absolute path and should not contain environment variables. The three levels of nesting limit do not apply.

**See Also:** Oracle Database Reference
**HS_FDS_CONNECT_INFO**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>None</td>
</tr>
<tr>
<td>Range of Values</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**HS_FDS_CONNECT_INFO** that describes the connection to the non-Oracle system.

The default initialization parameter file already has an entry for this parameter. This release of gateway can support IPv6. If IPv6 address format is to be specified, you would need to wrap square brackets around the IPv6 specification to indicate the separation from the port number.

For example,

```
HS_FDS_CONNECT_INFO=[2001:0db8:20c:f1ff:fec6:38af]:1300/sybase_db
```

The syntax for **HS_FDS_CONNECT_INFO** for the gateways are as follows:

**For Oracle Database Gateway for Sybase:**

```
HS_FDS_CONNECT_INFO=host_name:port_number/database_name
```

where, `host_name` is the host name or IP address of the machine hosting the Sybase database, `port_number` is the port number of the Sybase database server, and `database_name` is the Sybase database name.

**For Oracle Database Gateway for Informix:**

```
HS_FDS_CONNECT_INFO=host_name:port_number/server_name/database_name
```

where, `host_name` is the host name or IP address of the machine hosting the Informix database, `port_number` is the port number of the Informix database server, `server_name` is the name of the server machine for the Informix data, and `database_name` is the Informix database name.

**For Oracle Database Gateway for Teradata:**

```
HS_FDS_CONNECT_INFO=host_alias:port_number[/database_name]
```

where, `host_alias` is the host alias name or IP address of the machine hosting the Teradata database, `port_number` is the port number of the Teradata database server, and `database_name` is the Teradata database name. The `database_name` variable is optional.

**For Oracle Database Gateway for SQL Server:**

```
HS_FDS_CONNECT_INFO=host_name[[:port_number]|/[instance_name]]/[database_name]
```

where, `host_name` is the host name or IP address of the machine hosting the SQL Server database, `port_number` is the port number of the SQL Server database server, `instance_name` is the instance of SQL Server running on the machine, and `database_name` is the SQL Server database name. Either of the variables `port_number` or `instance_name` can be used, but not both together. Optionally, they both can be omitted. The variable `database_name` is always optional. The slash (/) is required when a particular value is omitted. For example, all of the following entries are valid:

```
HS_FDS_CONNECT_INFO=host_name/instance_name/database_name
HS_FDS_CONNECT_INFO=host_name//database_name
```
**Initialization Parameter Description**

**HS_FDS_CONNECT_INFO=host_name:port_name//database_name**

**HS_FDS_CONNECT_INFO=host_name/instance_name**

**HS_FDS_CONNECT_INFO=host_name**

**For Oracle Database Gateway for ODBC:**

**HS_FDS_CONNECT_INFO=dsn_value**

Where *dsn_value* is the data source name configured in the odbc.ini file.

**For Oracle Database Gateway for DRDA:**

**HS_FDS_CONNECT_INFO=IP_address:Port_number//Database_name,Type**

Where
- *IP_address* is the hostname or ip address of the DB2 DRDA server
- *Port_number* is the port number of the DB2 DRDA server
- *Database_name* is the database name of the DB2 server
- *Type* (case insensitive) is one of the following:
  - ZOS (DB2 UDB for z/OS),
  - IOS (DB2 UDB for iSeries), or
  - LUW (DB2 UDB for Linux, Unix, or Windows)

For example,

**HS_FDS_CONNECT_INFO=\[2001:0db8:20C:F1FF:FEC6:38AF\]:1300//DB2M,ZOS**

**HS_FDS_RECOVERY_ACCOUNT**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>RECOVER</td>
</tr>
<tr>
<td>Range of values</td>
<td>Any valid user ID</td>
</tr>
</tbody>
</table>

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 the non-Oracle system. For more information about the commit-confirm model, see the HS_TRANSACTION_MODEL parameter.

For DRDA, **HS_FDS_RECOVERY_ACCOUNT** specifies the user ID that is used by the gateway if a distributed transaction becomes in doubt. This user ID must have execute privileges on the package and must be defined to the IBM database.

If a distributed transaction becomes in doubt, then the Oracle database determines the status of the transaction by connecting to the IBM database, using the **HS_FDS_RECOVERY_ACCOUNT**. If this parameter is missing, then the gateway attempts to connect to a user ID of RECOVER.

The name of the recovery account is case-sensitive.


**HS_FDS_RECOVERY_PWD**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>none</td>
</tr>
<tr>
<td>Range of values</td>
<td>Any valid password</td>
</tr>
</tbody>
</table>

Specifies the password of the recovery account used for the commit-confirm transaction model set up at the non-Oracle system. For more information about the commit-confirm model, see the **HS_TRANSACTION_MODEL** parameter.

**HS_FDS_RECOVERY_PWD** is used with the **HS_FDS_RECOVERY_ACCOUNT**. The recovery user connects to the IBM database if a distributed transaction is in doubt.

**See Also:** *Oracle Database Gateway for DRDA User's Guide* for more information.

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

**HS_FDS_TRACE_LEVEL**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>OFF</td>
</tr>
<tr>
<td>Range of values</td>
<td>OFF, ON, DEBUG</td>
</tr>
</tbody>
</table>

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 by default to a gateway log file in LOG directory where the gateway is installed.
- DEBUG enables the tracing of detailed error messages that can be used for debugging.

**HS_FDS_TRANSACTION_LOG**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>HS_TRANSACTION_LOG</td>
</tr>
<tr>
<td>Range of Values</td>
<td>Any valid table name</td>
</tr>
</tbody>
</table>

Specifies the name of the table created in the non-Oracle system for logging transactions. For more information about the transaction model, see the **HS_TRANSACTION_MODEL** parameter.
**HS_FDS_FETCH_ROWS**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>100</td>
</tr>
<tr>
<td>Range of Values</td>
<td>Any integer between 1 and 1000</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_FETCH_ROWS=num</td>
</tr>
</tbody>
</table>

**HS_FDS_FETCH_ROWS** specifies the fetch array size. This is the number of rows to be fetched from the non-Oracle database and to return to Oracle database at one time. This parameter will be affected by the **HS_RPC_FETCH_SIZE** and **HS_RPC_FETCH_REBLOCKING** parameters.

**HS_FDS_CAPABILITY**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>None</td>
</tr>
<tr>
<td>Range of Values</td>
<td>Refer to Chapter 4, &quot;Developing Applications&quot; in Oracle Database Gateway for DRDA User’s Guide</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_CAPABILITY= {FUNCTION/(ON</td>
</tr>
</tbody>
</table>

If the **HS_FDS_CAPABILITY** is set to ON then the specified function will be sent to DB2 for processing. In other words, post processing will be not needed for that function.

If the **HS_FDS_CAPABILITY** is set to OFF then the specified function will be not be sent to DB2 for processing. In other words, it will be post processed.

If the **HS_FDS_CAPABILITY** is set to SKIP then the specified function will be stripped from the SQL statement sent to DB2. In other words the function will be ignored.

**HS_FDS_ISOLATION_LEVEL**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>CHG for DB2 UDB for iSeries, CS for DB2 UDB for z/OS, DB2 UDB for Linux, Unix, and Windows</td>
</tr>
<tr>
<td>Range of Values</td>
<td>{CHG</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_ISOLATION_LEVEL=(CHG</td>
</tr>
</tbody>
</table>

**HS_FDS_ISOLATION_LEVEL** specifies the isolation level that is defined to the package when it is created. All SQL statements that are sent to the remote DRDA database are executed with this isolation level. Isolation level seriously affects performance of applications. Use caution when specifying an isolation level other than the default. For information on isolation levels, refer to your IBM database manuals.

The following table lists the isolation levels and their descriptions. The levels are specified in ascending order of control, with CHG having the least reliable cursor stability and RR having the most. Note that higher stability uses more resources on the server and can lock those resources for extended periods.
**Table C-1  Isolation Levels and Their Descriptions**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHG</td>
<td>Change (default for DB2 UDB for iSeries)</td>
</tr>
<tr>
<td>CS</td>
<td>Cursor Stability (default for DB2 UDB for Linux, Unix, and Windows, and DB2 UDB for z/OS)</td>
</tr>
<tr>
<td>RR</td>
<td>Repeatable Read</td>
</tr>
<tr>
<td>ALL</td>
<td>ALL</td>
</tr>
<tr>
<td>NC</td>
<td>No Commit</td>
</tr>
</tbody>
</table>

**HS_FDS_PACKAGE_COLLID**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>ORACLEGTW</td>
</tr>
<tr>
<td>Range of Values</td>
<td>An alphanumeric string 1 to 18 characters in length</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_PACKAGE_COLLID=collection_id</td>
</tr>
</tbody>
</table>

**Note:** Any change to this parameter will cause a new package to be implicitly bound by the gateway. For DB2 for UDB iSeries, prior to attempting a connection, one should use the iSeries SQL command `CREATE SCHEMA` or `CREATE COLLECTION` to create an iSeries library with the name as specified for `HS_FDS_PACKAGE_COLLID`. This COLLECTION or SCHEMA should be created under the id specified in the `CONNECT TO` phrase of the Oracle SQL command `CREATE DATABASE LINK`.

**HS_IDLE_TIMEOUT**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>0 (no timeout)</td>
</tr>
<tr>
<td>Range of Values</td>
<td>0-9999 (minutes)</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_IDLE_TIMEOUT=num</td>
</tr>
</tbody>
</table>

Specify the read timeout value of HS RPC calls for Oracle gateways running on TCP protocol.

When there is no activity for a connected gateway session for this specified time period, the gateway session would be terminated automatically with pending update (if any) rolled back.

**HS_FDS_MBCS_TO_GRAPHIC**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
</tbody>
</table>
If set to TRUE, any single-byte character meant to insert to DB2 (var)graphic column would be converted to equivalent double-byte value before the insert operation.

**HS_FDS_GRAPHIC_TO_MBCS**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
<tr>
<td>Range of Values</td>
<td>FALSE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_GRAPHIC_TO_MBCS= {FALSE</td>
</tr>
</tbody>
</table>

If set to TRUE, any double-byte characters in DB2 (var)graphic column that can have equivalent single-byte equivalent would be translated to equivalent single-byte before sending to the user.

**HS_FDS_TIMESTAMP_MAPPING**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>DATE (except for DB2 which uses CHAR as default)</td>
</tr>
<tr>
<td>Range of Values</td>
<td>CHAR</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_TIMESTAMP_MAPPING= {CHAR</td>
</tr>
</tbody>
</table>

If set to CHAR, then non-oracle target timestamp would be mapped to CHAR (26). If set to DATE, then non-Oracle target timestamp would be mapped to Oracle date. If set to TIMESTAMP, then non-Oracle target timestamp would be mapped to Oracle timestamp.

**HS_FDS_DATE_MAPPING**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>DATE (except for Teradata which uses CHAR as default)</td>
</tr>
<tr>
<td>Range of Values</td>
<td>DATE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_DATE_MAPPING= {DATE</td>
</tr>
</tbody>
</table>

If set to CHAR, then non-oracle target date would be mapped to CHAR (10). If set to DATE, then non-Oracle target date would be mapped to Oracle date.
**HS_FDS_ARRAY_EXEC**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>TRUE (except for Oracle Database Gateway for DRDA which uses FALSE as default)</td>
</tr>
<tr>
<td>Range of values</td>
<td>{TRUE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_ARRAY_EXEC= {TRUE</td>
</tr>
</tbody>
</table>

If set to TRUE, the gateway will use array operations for insert, update, delete statements containing binds against the remote data source. The array size is determined by the value of the HS_FDS_FETCH_ROWS init parameter.

If set to FALSE, the gateway will not use array operations for insert, update, and delete statements. Instead, a single statement will be issued for every value.

**HS_FDS_QUOTE_IDENTIFIER**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td></td>
</tr>
<tr>
<td>Range of Values</td>
<td>TRUE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_QUOTE_IDENTIFIER= {FALSE</td>
</tr>
</tbody>
</table>

By default, the gateway will quote identifiers if the FDS supports it. However, we give the user the ability to overwrite the behavior.

**HS_NLS_LENGTH_SEMANTICS**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>BYTE</td>
</tr>
<tr>
<td>Range of values</td>
<td>BYTE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_NLS_LENGTH_SEMANTICS = { BYTE</td>
</tr>
</tbody>
</table>

This release of gateway has Character Semantics functionality equivalent to the Oracle database Character Semantics (i.e., NLS_LENGTH_SEMANTICS). When HS_NLS_LENGTH_SEMANTICS is set to CHAR, the (var)char and (var)graphic columns of DB2 are to be interpreted as having CHAR semantics. For example, DB2 CHAR(10) would be described to Oracle as CHAR(10 CHAR) assuming there is no ratio expansion from Gateway character set to Oracle character set. The only situation the gateway doesn’t honor the HS_NLS_LENGTH_SEMANTICS=CHAR setting is when both Oracle and gateway are on the same Multi-byte character set.

**HS_KEEP_REMOTE_COLUMN_SIZE**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>OFF</td>
</tr>
</tbody>
</table>
HS_KEEP_REMOTE_COLUMN_SIZE specifies whether to suppress ratio expansion when computing the length of (VAR)CHAR datatypes during data conversion from non-Oracle database to Oracle database. When it is set to REMOTE, the expansion is suppressed between the non-Oracle database to the gateway. When it is set to LOCAL, the expansion is suppressed between the gateway and Oracle database. When it is set to ALL, the expansion is suppressed from the non-Oracle database to the Oracle database.

When the parameter is set, the expansion is suppressed when reporting the remote column size, calculating the implicit resulting buffer size, and instantiating in the local Oracle database. This has effect only for remote column size from the non-Oracle database to Oracle database. If the gateway runs on Windows and HS_LANGUAGE=AL32UTF8, then you must not specify this parameter, as it would influence other ratio related parameter operation. It has no effect for calculating ratio for data moving from Oracle database to non-Oracle database through gateway during INSERT, UPDATE, or DELETE.

**HS_FDS_RESULTSET_SUPPORT**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
<tr>
<td>Range of values</td>
<td>TRUE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_RESULTSET_SUPPORT = { TRUE</td>
</tr>
</tbody>
</table>

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_REMOTE_DB_CHARSET**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>None</td>
</tr>
<tr>
<td>Range of values</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_REMOTE_DB_CHARSET</td>
</tr>
</tbody>
</table>

This parameter is valid only when HS_LANGUAGE is set to AL32UTF8 and the gateway runs on Windows. As more Oracle databases and non-Oracle databases use Unicode as
database character sets, it is preferable to also run the gateway in Unicode character set. To do so, you must set HS\_LANGUAGE=AL32UTF8. However, when the gateway runs on Windows, the Microsoft ODBC Driver Manager interface can exchange data only in the double-byte character set, UCS2. This results in extra ratio expansion of described buffer and column sizes. To compensate, the gateway can re-adjust the column size if HS\_FDS\_REMOTE\_DB\_CHARSET is set to the corresponding non-Oracle database character set. For example, HS\_FDS\_REMOTE\_DB\_CHARSET=KO16KSC5601.

**HS\_FDS\_SUPPORT\_STATISTICS**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>TRUE</td>
</tr>
<tr>
<td>Range of values</td>
<td>{TRUE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_SUPPORT_STATISTICS= {TRUE</td>
</tr>
</tbody>
</table>

We gather statistics from the non-Oracle database by default. You can choose to disable the gathering of remote database statistics by setting the HS\_FDS\_SUPPORT\_STATISTICS parameter to FALSE.

**HS\_FDS\_RSET\_RETURN\_ROWCOUNT**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>FALSE</td>
</tr>
<tr>
<td>Range of values</td>
<td>{TRUE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_RSET_RETURN_ROWCOUNT= {TRUE</td>
</tr>
</tbody>
</table>

When set to TRUE, the gateway returns the row counts of DML statements that are executed inside a stored procedure. The row count is returned as a single row, single column result set of type signed integer.

When set to FALSE, the gateway skips the row counts of DML statements that are executed inside a stored procedure. This is the default behavior, and it is the behavior of 11.1 and older gateways.

**HS\_FDS\_SQLLEN\_INTERPRETATION**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>64</td>
</tr>
<tr>
<td>Range of values</td>
<td>{64</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_SQLLEN_INTERPRETATION= {64</td>
</tr>
</tbody>
</table>

This parameter is only valid for 64 bit platforms. ODBC standard specifies SQLLEN (of internal ODBC construct) being 64 bit on 64 bit platforms, but some ODBC driver managers and drivers violate this convention, and implement it as 32 bit. In order for the gateway to compensate their behavior, you need to specify HS\_FDS\_SQLLEN\_INTERPRETATION=32 if you use these types of driver managers and driver.
### HS_FDS_AUTHENTICATE_METHOD

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>CLEARTEXT</td>
</tr>
<tr>
<td>Range of values</td>
<td>(CLEARTEXT</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_AUTHENTICATE_METHOD= {CLEARTEXT</td>
</tr>
</tbody>
</table>

Specifies the way in which userid and password are sent to the remote DB2 server and authenticated. Valid values are:
- **CLEARTEXT**: user ID and password are sent in clear text to server (default).
- **ENCRYPT**: password is sent encrypted to server.
- **ENCRYPT_BOTH**: user ID and password are sent encrypted to server.
- **CLIENT**: userid is validated on the client side instead of by the server.
- **KERBEROS**: uses Kerberos to authenticate user ID.

### HS_FDS_ENCRYPT_SESSION

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>NONE</td>
</tr>
<tr>
<td>Range of values</td>
<td>NONE</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_ENCRYPT_SESSION = {NONE</td>
</tr>
</tbody>
</table>

Specifies the way the session to DB2 is encrypted. Valid values are:
- **NONE**: data session is not encrypted (default).
- **SSL**: Use SSL to encrypt data session (supported only by DB2 for iSeries).
- **DB2**: Use DB2 encryption protocol for data session (supported only by DB2 for LUW and DB2 for z/OS, and can be used only when authentication is CLEARTEXT, ENCRYPT, or ENCRYPT_BOTH).

### HS_FDS_TRUSTSTORE_FILE

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>none</td>
</tr>
<tr>
<td>Range of values</td>
<td>path to truststore file</td>
</tr>
<tr>
<td>Syntax</td>
<td>HS_FDS_TRUSTSTORE_FILE = path to truststore file</td>
</tr>
</tbody>
</table>

Specifies the path that specifies the location of the truststore file. The truststore file contains a list of the valid Certificate Authorities (CAs) that are trusted by the client machine for SSL server authentication.
**HS_FDS_TRUSTSTORE_PASSWORD**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Value</td>
<td>none</td>
</tr>
<tr>
<td>Range of values</td>
<td>password</td>
</tr>
<tr>
<td>Syntax</td>
<td><code>HS_FDS_TRUSTSTORE_PASSWORD= password</code></td>
</tr>
</tbody>
</table>

Specifies the password required to access the truststore.
The table below is a worksheet that lists all of the parameter names and the reasons that you will need them for configuring the gateway and TCP/IP. Use the worksheet to gather the specific information that you need before you begin the configuration process.

### Table D–1  List of Parameters Needed to Configure the Gateway

<table>
<thead>
<tr>
<th>Reason</th>
<th>Name of Parameter Needed</th>
<th>Your Specific Parameters Here</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle home of the gateway</td>
<td>ORACLE_HOME</td>
<td></td>
</tr>
<tr>
<td>System ID of the gateway</td>
<td>ORACLE_SID</td>
<td></td>
</tr>
<tr>
<td>Remote collection ID</td>
<td>HS_FDS_PACKAGE_COLLID</td>
<td></td>
</tr>
<tr>
<td>Configuring TCP/IP</td>
<td>Local Hostname, Domain Name</td>
<td></td>
</tr>
<tr>
<td>Configuring TCP/IP</td>
<td>IP Address</td>
<td></td>
</tr>
<tr>
<td>Configuring TCP/IP</td>
<td>Network Mask</td>
<td></td>
</tr>
<tr>
<td>Configuring TCP/IP</td>
<td>Name Server IP Address</td>
<td></td>
</tr>
<tr>
<td>Configuring TCP/IP</td>
<td>DRDA Server Hostname or IP Address</td>
<td></td>
</tr>
<tr>
<td>Configuring TCP/IP</td>
<td>DRDA Server Service Port Number</td>
<td></td>
</tr>
<tr>
<td>Recovery user ID</td>
<td>HS_FDS_RECOVERY_ACCOUNT</td>
<td></td>
</tr>
<tr>
<td>Recovery Password</td>
<td>HS_FDS_RECOVERY_PWD</td>
<td></td>
</tr>
<tr>
<td>Remote Database Name</td>
<td>HS_FDS_CONNECT_INFO</td>
<td></td>
</tr>
</tbody>
</table>
Table D–1  (Cont.) List of Parameters Needed to Configure the Gateway

<table>
<thead>
<tr>
<th>Reason</th>
<th>Name of Parameter Needed</th>
<th>Your Specific Parameters Here</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner ID of DRDA package</td>
<td>HS_FDS_PACKAGE_OWNER</td>
<td></td>
</tr>
<tr>
<td>DB Name used with Oracle database</td>
<td>HS_DB_NAME</td>
<td></td>
</tr>
<tr>
<td>DB Domain used with Oracle database</td>
<td>HS_DB_DOMAIN</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The user ID that is used to bind or rebind the DRDA package must have the appropriate privileges on the remote database as described in Chapter 13, "Configuring the DRDA Server". Your database administrator will need to provide these privileges.
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