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I  Identifying Listener Processes

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Send Us Your Comments

Oracle Database Installation Guide, 10g Release 1 (10.1) for hp OpenVMS Alpha
Part No. B13681-01

Oracle welcomes your comments and suggestions on the quality and usefulness of this publication. Your input is an important part of the information used for revision.

- Did you find any errors?
- Is the information clearly presented?
- Do you need more information? If so, where?
- Are the examples correct? Do you need more examples?
- What features did you like most about this manual?

If you find errors or have other suggestions for improvement, you can e-mail them to us at osdwrite_us@oracle.com. Please indicate the title and part number of the document and the chapter, section, and page number, if available. Please indicate whether you would like a reply.

If you have problems with the software, please contact your local Oracle Support Services.
Preface

This guide and Oracle Database Administrator’s Reference (B13738-01) provide instructions for installing and configuring Oracle Database 10g on hp OpenVMS Alpha systems. Documentation for the products that are included with this software is in the Oracle Database generic documentation set.

For important release information related to this product, refer to Oracle Database Release Notes (B15916-01).

Intended Audience

This document is intended for anyone responsible for installing Oracle Database 10g on hp OpenVMS Alpha systems.

Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Standards will continue to evolve over time, and Oracle is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For additional information, visit the Oracle Accessibility Program Web site at

http://www.oracle.com/accessibility/

Accessibility of Code Examples in Documentation

JAWS, a Windows screen reader, may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, JAWS may not always read a line of text that consists solely of a bracket or brace.

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- For technical questions, call 1.800.446.2398
- For non-technical questions, call 1.800.464.2330

For the Latest Information

For the latest information about Oracle Database and related products, refer to the README files in the Oracle product directories.

Install Only Licensed Products

You are entitled to install and use only those products for which you have a current Oracle license agreement.

Terminology

In this document, the name of the operating system, hp OpenVMS Alpha, has been shortened to OpenVMS.

Typographic Conventions

The following table describes the conventions used in the text of this documentation set.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>monospace</td>
<td>The use of Monospace type indicates OpenVMS DCL commands, directory names, user names, path names, and file names.</td>
</tr>
<tr>
<td>brackets [ ]</td>
<td>Words enclosed in brackets indicate key names. For example, [Enter]. Note that brackets have a different meaning when used in command syntax.</td>
</tr>
<tr>
<td>italics</td>
<td>The use of Italic type indicates a logical, including logical portions of file names. It is also used for emphasis.</td>
</tr>
<tr>
<td>UPPERCASE</td>
<td>Uppercase letters indicate Structured Query Language (SQL) reserved words, initialization parameters, and environment logicals.</td>
</tr>
</tbody>
</table>

Command Syntax

OpenVMS command syntax is displayed in monospace font. The "$" character at the beginning of command examples should not be entered at the prompt.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>- (hyphen)</td>
<td>A hyphen indicates a command that is too long to fit on a single line. Enter the line as printed or enter it as a single line without a hyphen. For example:</td>
</tr>
<tr>
<td></td>
<td>copy disk$server25:[oracle10g20.rdbms.admin]*.sql - disk$server2:[oracle.rdbms.admin]</td>
</tr>
<tr>
<td>Convention</td>
<td>Meaning</td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>braces [ ]</td>
<td>Braces indicate required items. For example, <code>DEFINE (macro1)</code></td>
</tr>
</tbody>
</table>
| brackets [ ] | Brackets indicate optional items. For example: `cvtcrt termname [outfile]`  
Note that brackets have a different meaning when used in regular text. |
| ellipses . . . | Ellipses indicate an arbitrary number of similar items. For example:  
`CHKVAL fieldname value1 value2... valueN` |
| italics | *Italic type* indicates a variable or placeholder. Substitute a value for the logical. For example, `directory_path`. |
| vertical line | A vertical line indicates a choice within braces or brackets.  
For example, `SIZE filesize [K|M]` |

### Related Documentation

Information about system administration and tuning for a production database system is provided in the following documents:

- *Oracle Database Administrator’s Reference* (B13738-01)
- *Oracle Database Administrator’s Guide* (B10739-01)
- *Oracle Database Net Services Administrator’s Guide* (B10775-01)
- *Oracle Database Net Services Reference* (B10776-01)
- *Oracle Database Performance Tuning Guide* (B10752-01)

Information about upgrading from a previous version of Oracle Database is provided in *Oracle Database Upgrade Guide*.

The platform-specific documentation for Oracle Database 10g products includes the following manuals:

- *Oracle Database Installation Guide* (B13681-01)
- *Oracle Database Release Notes* (B15916-01)
- *Oracle Database Upgrade Guide* (B10763-02)
- *Oracle Real Application Clusters Installation and Configuration Guide* (B10766-08)
- *Oracle Transparent Gateway for Rdb Administrator’s Guide* (B10537-01)
- *Oracle Transparent Gateway for RMS Administrator’s Guide* (B10538-01)

Refer to Oracle Database Release Notes for your platform for important information that was not available when this book was released. The Release Notes for Oracle Database 10g are updated regularly. You can get the most recent version from Oracle Technology Network at  

### Oracle Services and Support

The Oracle corporate Web page is located at the following Web site:
Oracle offers a wide range of services to help facilitate corporate system solutions, including Oracle Education courses, Oracle Consulting services, and Oracle Support Services from the Web site. In addition, Oracle provides free trial software, updates on Oracle products, and service and technical brochures and data sheets.

**Oracle Support Services**
Technical Support contact information worldwide is listed at the following Web site:

http://www.oracle.com/support

Templates are provided to help you prepare information about your problem before you call. You will also need your CSI number (if applicable) or complete contact details, including any special project information.

**OracleMetaLink**
OracleMetaLink is the Oracle Web service for technical information. Members of OracleMetaLink can search for updates, alerts, patches, and other information about products, releases, and operating systems, and can set preferences to be notified automatically of new information. OracleMetaLink offers a variety of services to assist in the setup and administration of Oracle products, including procedures, scripts, commentary, and tuning and configuration best-practices bulletins. In addition, it offers forums for information sharing among Oracle customers, and it offers direct communication with Oracle Support. OracleMetaLink is available to Product Support Customers at no extra cost. Sign up for free membership for this service at the following Web site:

http://www.oracle.com/support/metalink

Use your Support Access Code (SAC) number to register.

**Products and Documentation**
For U.S.A. customers, Oracle Store is at the following Web site:

http://store.oracle.com

Links to Stores in other countries are provided from this site.

Product documentation can be found at the following Web site:

http://docs.oracle.com

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Global Customer Service contacts are listed at the following Web site:

http://www.oracle.com/support/

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http://education.oracle.com

**Oracle Technology Network**
Register with the Oracle Technology Network the following Web site:

http://www.oracle.com/technology/
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Notwithstanding anything to the contrary in the Oracle program license, the IBM software is provided “as is” and without intellectual property indemnities, warranties, or support of any kind from Oracle or IBM.
This chapter describes the different types of Oracle Database installations that you can perform, as well as issues that you should consider before installing the software.

The following topics are discussed in this chapter:

- Section 1.1, "Installation Overview"
- Section 1.2, "Changes and Enhancements"
- Section 1.3, "Oracle Database Installation Types"
- Section 1.4, "Database Configuration Options"
- Section 1.5, "Overview of DBCA"
- Section 1.6, "Installation Options Available in This Release"
- Section 1.7, "Upgrading from an Earlier Release of Oracle Database"
- Section 1.8, "Important Compatibility Issues"
- Section 1.9, "Installation Considerations"
- Section 1.10, "Cluster File System"

### 1.1 Installation Overview

The Oracle Database installation process consists of five phases:

1. **Planning the installation**
   
   This chapter describes the Oracle products that you can install and issues that you must consider before starting the installation.

2. **Completing preinstallation tasks**
   
   Chapter 2 describes preinstallation tasks that you must complete before installing the product.

3. **Installing the software**
   
   Chapter 3 describes how to use Oracle Universal Installer to install the product.

4. **Completing postinstallation tasks**
   
   Chapter 4 describes recommended and required postinstallation tasks.

5. **Installing the client software**
   
   If you want to install client tools, applications, and client interfaces that are not included on the Oracle Database CD-ROM, then refer to the documentation for those products.
1.2 Changes and Enhancements

To make full use of the latest OpenVMS CPU and compiler optimizations in Oracle software products, Oracle Database 10g release 1 (10.1) and associated Oracle products that are based on Oracle Database 10g requires an OpenVMS system with an EV56 or later generation CPU.

---

**Note:** Oracle Database 10g Release 1 (10.1.0.3.0) is not certified on and is, therefore, not supported on Alpha chip sets earlier than EV56.

---

**See Also:** Note 181307.1 on OracleMetaLink for a list of affected models and for instructions about how to identify the CPU model number.

---

The following changes and enhancements are unique to this release of Oracle Database:

- Section 1.2.1, "Turning Off the Image Dump"
- Section 1.2.2, "Oracle Database Dependency on ODS-5 Disk Structure"
- Section 1.2.3, "Oracle Database Installation Directory Structure"
- Section 1.2.4, "Unsupported Initialization Parameters"
- Section 1.2.5, "Deprecated Initialization Parameters"

### 1.2.1 Turning Off the Image Dump

In earlier releases, when one of the background processes terminated abruptly with an access violation, no useful information was readily available regarding the cause for termination. For troubleshooting, certain actions needed to be taken, and the failure needed to be reproduced. Starting with this release, by default, an image dump is created when a background process terminates abruptly. If you do not want an Oracle background process to generate image dump files, then create an OpenVMS system logical for that background process as follows:

```
$ define/system ORA_sid_bg_process_DMP FALSE
```

In the preceding command, the value of `bg process` can be `pmon`, `lmd0`, `lms0`, and so on. The value of `sid` should be set to the required SID or instance name.

Start the instance, and open the database. For example:

```
$ define/system ORA_PROD_LMD0_DMP FALSE
$ sqlplus/nolog
SQL> connect / as sysdba
SQL> startup
```

This change has no effect on the usual daily production activities. Oracle recommends that you do not define the dump logical.

---

**Note:** OpenVMS logicals must be defined prior to starting the instance.

```
$ define/system ORA_PROD_LMD0_DMP FALSE
$ sqlplus/nolog
SQL> connect / as sysdba
SQL> startup
```

---

This change has no effect on the usual daily production activities. Oracle recommends that you do not define the dump logical.
1.2.2 Oracle Database Dependency on ODS-5 Disk Structure

On-Disk Structure Level 5 (ODS-5) format enables OpenVMS to support Microsoft Windows file name formats. Longer file names, additional character support, and the ability to have lowercase and mixed-case file names are some of the features supported on ODS-5 disks.

---

**Caution:** Oracle recommends that you read *OpenVMS Guide to Extended File Specifications* before changing the structure of any disk. This guide describes ODS-2 and ODS-5 formats in more detail and provides important information that you must follow.

---

The disks on which the Oracle code tree resides must be formatted in Files-11 ODS-5 format. This is the disk to which the OpenVMS logicals `ora_root`, `ora_rootdir`, and `oracle_home` point. The directory that is referenced by these logicals is the parent directory for all Oracle Database software, such as Apache, CTX, INSTALL, NETCONFIG, RDBMS, and UTIL. The disks on which Oracle Database files reside can be formatted as either ODS-2 or ODS-5.

**See Also:** Oracle Note 286895.1 on OracleMetaLink

Alternatively, use the search function and search for ODS-5 for more information.

**Precautions**

You must observe the following precautions:

- Do not change the format of any OpenVMS disk without first making a backup of the disk.
- Conversion from ODS-2 to ODS-5 does not require you to restore files.
- Conversion from ODS-5 to ODS-2 requires you to restore files.

---

**Note:** Contact Hewlett-Packard for more information about reverting to ODS-2 format from ODS-5 format.

---

**Checking Disk Format**

To check the current disk format, run the following DCL command:

```
$ SHOW DEVICE/FULL device_name
```

The `Volume Status:` line of the output displays the current ODS level. The default when initializing disks is ODS-2.

**Changing Disk Format**

If you plan to reformat an existing (in use) disk from ODS-2 to ODS-5 format, then:

1. Create at least one OpenVMS backup of the disk.
2. Use the following command:

```
$ SET VOLUME /STRUCTURE_LEVEL=5 device_name
```

Example:

```
$ SET VOLUME/STRUCTURE_LEVEL=5 $2$DKC100:
```
Formatting a New Disk

If you plan to use a new (empty) disk, then use the following command to format the new disk to ODS-5 format:

```
$ INITIALIZE/STRUCTURE=5 device_name:volume_label
```

Example:

```
INITIALIZE/STRUCTURE=5 $2$DKC100: TESTVOL
```

1.2.3 Oracle Database Installation Directory Structure

The installation directory structure of Oracle Database closely resembles that of the installation directory structure of Oracle Database on UNIX systems. By making the OpenVMS installation directory structure similar to that of other platforms, a more consistent and predictable layout is followed across platforms. This enables database administrators (DBAs) from other platforms to quickly become familiar with Oracle Database for this platform.

1.2.4 Unsupported Initialization Parameters

Support for the following Oracle Database initialization parameters found in earlier releases has been removed starting with this release of Oracle Database.

- ALWAYS_ANTI_JOIN
- ALWAYS_SEMI_JOIN
- JOB_QUEUE_INTERVAL
- OPTIMIZER_PERCENT_PARALLEL
- HASH_MULTIBLOCK_IO_COUNT
- DB_BLOCK_LRU_LATCHES
- DB_BLOCK_MAX_DIRTY_TARGET
- SORT_MULTIBLOCK_READ_COUNT
- DB_FILE_DIRECT_IO_COUNT
- GC_DEFER_TIME
- GC_RELEASABLE_LOCKS
- GC_ROLLBACK_LOCKS
- LM_LOCKS
- LM_RESS
- USE_INDIRECT_DATA_BUFFERS

1.2.5 Deprecated Initialization Parameters

The following initialization parameters are deprecated starting with this release of Oracle Database.

- ROLLBACK_SEGMENTS
- FAST_START_IO_TARGET
- TRANSACTIONS_PER_ROLLBACK_SEGMENT
- LOG_CHECKPOINT_INTERVAL
1.3 Oracle Database Installation Types

You can select one of the following installation types when installing Oracle Database:

- **Enterprise Edition**: Installs licensable Oracle Database options and database configuration and management tools. It also installs products that are commonly used for data warehousing and transaction processing.

- **Custom**: Enables you to select the individual components that you want to install from a list of available components.

---

**Note:** Oracle Database Client is installed in a separate Oracle home. Do not install Oracle Database Client in the Oracle home used for Oracle Database software.

Oracle Enterprise Manager 10g is available separately in the Oracle Database media pack.

---

**See Also:**

- Oracle Enterprise Manager 10g Concepts and Oracle Enterprise Manager 10g Installation and Basic Configuration for more information about Oracle Enterprise Manager 10g

- Oracle Database Licensing Information (B13552-01) guide for more information about the features available with each Oracle Database edition and information about licensing

1.4 Database Configuration Options

During the installation, you can specify that you want to create an Oracle Database as part of the installation. If you choose to create an Oracle Database, Oracle Universal Installer uses the Database Configuration Assistant (DBCA) to create it. You can choose to create one of the preconfigured database types, which are designed for different types of applications, modify one of the preconfigured database types, or create a customized database to suit your requirements.

This section contains the following topics:

- Section 1.4.1, "Database Options"
- Section 1.4.2, "Installation Choices That Affect Database Creation"
- Section 1.4.3, "Creating a Database After Installation"

1.4.1 Database Options

Depending on your requirements, you may want to install a specific database type or install other Oracle products without installing a database. This section provides information about the following database options:

- Section 1.4.1.1, "General Purpose"
- Section 1.4.1.2, "OLTP"
1.4.1.1 General Purpose
Users of this database type perform a variety of database tasks, ranging from simple transactions to complex queries. Select this database environment for general purpose use.

1.4.1.2 OLTP
Users of this database type perform large numbers of concurrent transactions, in which each transaction is a relatively simple operation that is processing a small amount of data.

Billing databases, such as those commonly found on Internet commerce Web sites, are the most common example of this database configuration. These databases are also known as Online Transaction Processing (OLTP) databases.

1.4.1.3 Customized
This option enables you to create a customized database configuration of Oracle products that meets specialized requirements. Select this option only if you are prepared to provide detailed product and database environment choices. Processing this option involves a longer installation session than choosing a preconfigured database.

1.4.1.4 Software Only
This option enables you to install Oracle products. It does not configure the listeners or the network infrastructure, and it does not create a database.

Oracle recommends that you install at least one preconfigured database to serve as a template for database configuration.

1.4.2 Installation Choices That Affect Database Creation
Depending on the choices that you make during the installation, Oracle Universal Installer runs DBCA in one of two modes:

- Noninteractive mode
  If you select the Enterprise Edition installation type, then choose a preconfigured database type. Oracle Universal Installer prompts you for the minimum amount of information required to create a database of the type you choose. It then runs DBCA in noninteractive mode to create the database after it installs the software.

  **Note:** Oracle recommends that you use this method to create a database if you have not previously created one.

- Interactive mode
  If you select the Custom installation type, then Oracle Universal Installer does not prompt you for database information. Instead, it installs the software and then runs DBCA in interactive mode. By using the screens in DBCA, you can either modify one of the preconfigured database types or create a custom database and specify how you want to configure it.
1.4.3 Creating a Database After Installation

If you decide not to create a database during the installation, then you can use DBCA to create one after you have installed the software.

See Also: Oracle Database 2 Day DBA (B10742-03) for more information about using DBCA to create a database after installation

1.5 Overview of DBCA

Database Configuration Assistant (DBCA) enables you to copy a preconfigured Oracle Database, or to create a fully customized database to match the selected environment and database configuration. It starts automatically (unless you selected software only) after Oracle Database software has been installed during an installation session.

When installing Oracle Database software using any database configuration option other than Custom and Software Only, Oracle Universal Installer prompts for a global database name and system identifier (SID). After Oracle Database installation is complete, DBCA uses this information to create a database.

The following list provides descriptions of database configurations:

- **General Purpose**
  If you select this option with an Enterprise Edition installation, then DBCA creates a preconfigured, ready-to-use, multipurpose database with the following features:
  - Default initialization parameters using server parameter file and Automatic Undo Management
  - Automatic installation and configuration of Oracle Options and interMedia
  - Advanced Replication capabilities
  - Database configuration of dedicated server mode
  - Archiving mode of NOARCHIVELOG

- **Transaction Processing**
  If you select this option, then DBCA creates a preconfigured, ready-to-use OLTP database.

- **Data Warehouse**
  If you select this option, then DBCA creates a database that is fully enabled for data warehousing applications.

- **Customized**
  If you select this option, then DBCA guides you in creating a fully customized database.

- **Automatic or Manual**
  Automatic or manual configuration options, Oracle Text components, and advanced replication.
Select this option only if you are experienced with advanced database creation procedures.
You will need to customize some or all of the following settings or parameters:

- Data, control, and redo log file settings
- Tablespace and extent sizes
- Database memory parameters
- Archiving modes, formats, and destinations
- Trace file destinations
- Character set values

Software Only
If you select this option, then Oracle Universal Installer only installs Oracle Database software. DBCA does not start after installation, and no preconfigured database is installed.

If a choice other than the Software Only option is selected for database configuration, then Oracle Universal Installer starts DBCA during the installation session. If a "Software Only" installation is performed, then DBCA can be run later from the command line.

See Also:
- Section B.5, "Running DBCA in Noninteractive or Silent Mode" for more information about running DBCA from the command line
- Oracle Database Globalization Support Guide (B10749-02) for more information about database character sets

1.6 Installation Options Available in This Release
The current release of Oracle Database provides new options for simplifying database administration tasks. These include:

- Section 1.6.1, "Database Storage Options"
- Section 1.6.2, "Database Backup and Recovery Options"

1.6.1 Database Storage Options
If you choose to create a database during the installation, then you can specify the File System option as the storage option for database files.

File System
Automated Storage Management (ASM) is not supported as a storage option in this release. If you select the File System option, then DBCA creates the database files in a directory on a device mounted on the system. Oracle recommends that the device that you select be separate from the devices that are used by the operating system or by Oracle products. The device that you select can be any of the following:

- A standalone device
- A device on a logical volume manager (LVM) volume or RAID device
If you are using multiple disks in an logical volume manager (LVM) or RAID configuration, then Oracle recommends that you use the stripe-and-mirror-everything (SAME) methodology to improve performance and reliability.

**See Also:** Oracle Database Administrator’s Guide (B10739-01)

### 1.6.2 Database Backup and Recovery Options

If you choose to use Oracle Enterprise Manager Grid Control during the installation, then you can enable automated database backups that use the default backup strategy recommended by Oracle.

**Note:** You do not have to enable automated backups during the installation. If you prefer, you can use Oracle Enterprise Manager Grid Control to configure automated backups after you install the software and create a database.

**Enabling Automated Backups**

If you enable automated backups, then Oracle Enterprise Manager schedules a daily backup job that uses Oracle Recovery Manager (RMAN) to back up all the database files to an on-disk storage area called the flash recovery area. The first time the backup job runs, it creates a full backup of the database. Subsequent backup jobs perform incremental backups.

To enable automated backup jobs during installation, you must specify the following information:

- **The location of the flash recovery area**
  
  You can select a device directory or accept the default for the flash recovery area. The default disk quota configured for the flash recovery area is 2 GB.

- **An operating system user name and password for the backup job**

  Oracle Enterprise Manager uses the operating system credentials that you specify when running the backup job. The user name that you specify must have the appropriate privileges and rights required for database administrators.

**See Also:** Chapter 2 for information about choosing the location of the flash recovery area and determining the disk space requirements and about the requirements for the database administrator account

**Backup Job Default Settings**

If you enable automated backups after choosing one of the preconfigured databases during the installation, then automated backup is configured with the following default settings:

- **The backup job is scheduled to run nightly at 2 a.m.**

- **The disk quota for the flash recovery area is 2 GB.**

If you enable automated backups by using DBCA, either during or after the installation, you can specify a start time for the backup job and a disk quota for the flash recovery area.
1.7 Upgrading from an Earlier Release of Oracle Database

**Note:** You must not upgrade an Oracle Database 7.3.2 for VAX VMS to an Oracle Database 10g (10.1.0.3.0) for OpenVMS. You must perform an export or import operation to carry out this type of upgradation.

To manually upgrade an existing database to Oracle Database 10g on OpenVMS, follow the steps in Oracle Database Upgrade Guide. In Chapter 3 of that guide, make the following modifications in the steps outlined for OpenVMS:

In the "Upgrade the Database" subsection of the "Upgrade the Database Manually" section, instead of Steps 4 and 5 (Setting the environment variables to point to the new release 10.1 directories), start the mig*.com script under ora_root:[rdbms] appropriate for the upgrade path:

- For an upgrade from 8.1.7 or 9.0.1 to 10g, enter @migrate89.com
- For an upgrade from 9.2 to 10g, enter @migrate92.com

After you complete this step, proceed with Step 7 in this subsection, which involves changing to the ora_root:[rdbms.admin] directory.

1.7.1 Upgrade Issues

For more information about upgrading a previous release of Oracle Database to Oracle Database 10g, refer to Oracle Database Upgrade Guide. The following section includes additional upgrade information that you should review before upgrading an existing database.

**AL24UTFFSS Character Set**

To upgrade an existing database that uses the AL24UTFFSS character set, upgrade the database character set to UTF8 before upgrading to Oracle Database. Oracle recommends that you use the Character Set Scanner (csscan) utility for data analysis before attempting to upgrade the existing database character set.

The Character Set Scanner utility checks all character data in the database and tests for the effects of, and problems with, changing the character set encoding.
1.8 Important Compatibility Issues

**Caution:** If you are installing Oracle Database 10g on a node where other versions of Oracle Database are running, then ensure that you have no Oracle symbols and logicals defined prior to installing Oracle Database 10g. Do not run any `orauser` scripts as part of the login sequence. Failure to heed this warning will result in numerous problems, including undefined symbols and overwriting of the previous code tree.

The follow are compatibility issues that you must address:

- Oracle Database 10g Enterprise Edition must be installed in a location separate from other previous Oracle Database installations.
- Oracle products released for earlier versions of Oracle Database (such as release 9.2.0.x and release 8.1.7.x) must not be linked with an Oracle Database 10g installation.

**Note:** To install Globalization Support, you must first build all Oracle products. The product directories must exist before Globalization Support message files can be copied into them.

1.9 Installation Considerations

This section contains information about the following considerations, which you must address before deciding how to install Oracle Database:

- Section 1.9.1, "Hardware and Software Certification"
- Section 1.9.2, "Multiple Oracle Homes"
- Section 1.9.3, "Logicals and Symbols"
- Section 1.9.4, "Oracle CSS Daemon"

1.9.1 Hardware and Software Certification

The hardware and software requirements included in this installation guide are current at the time of publishing this guide. However, because new platforms and operating system software versions may be certified after this guide is published, review the certification matrix on the OracleMetaLink Web site for an updated list of certified hardware platforms and operating system versions. You can visit the OracleMetaLink Web site at

http://metalink.oracle.com

If you do not have a current Oracle Support Services contract, then you can access the same information from the Oracle Technology Network Web site at

http://www.oracle.com/support/metalink/content.html

1.9.2 Multiple Oracle Homes

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.
However, you must install this release of the product into a new Oracle home directory. You cannot install products from one release of Oracle Database into the Oracle home directory of a different release. For example, you cannot install Oracle Database 10g software into an existing Oracle9i Database Oracle home directory. If you attempt to install this release into an Oracle home directory that contains software from an earlier Oracle release, then the installation fails.

1.9.3 Logicals and Symbols

**Note:** Before installing Oracle software, you must log out of any existing Oracle sessions. If you do not do this, then the new installation includes the logicals and symbols of the active Oracle sessions.

Ensure that the login.com file of the account that is used to install Oracle Database does not define any of the Oracle logicals or symbols, or does not run any command file that may define them. Ensure that none of the general Oracle specific logicals (typically beginning with $ORA$) are defined in the system table, except for some of the logicals related to mailbox devices and shared libraries. Oracle Database may not run correctly if these logicals are defined.

1.9.4 Oracle CSS Daemon

For Oracle Real Application Clusters (RAC) installations, the Oracle Cluster Synchronization Services (CSS) daemon is installed with Oracle Cluster Ready Services (CRS) in a separate Oracle home directory.

**See Also:** Section 8.3, "Reconfiguring Oracle Cluster Synchronization Services" for more information about deleting and reconfiguring the Oracle CSS daemon.

1.10 Cluster File System

In this document, there are references to the term cluster file system. This term refers to the configuration in which all disks are equally accessible from all nodes on the cluster. This is the most commonly used configuration on an OpenVMS cluster. All references to this term should be considered as references to this configuration on an OpenVMS cluster.
This chapter describes the following tasks, which you must complete before you start Oracle Universal Installer:

- Section 2.1, "Checking Hardware Requirements"
- Section 2.2, "Checking Network Requirements for RAC"
- Section 2.3, "Checking Software Requirements"
- Section 2.4, "OpenVMS and Installation-Specific Issues and Restrictions"
- Section 2.5, "Creating a User Account"
- Section 2.6, "OpenVMS SYSGEN Parameters"
- Section 2.7, "OpenVMS System Configuration"
- Section 2.8, "Performing Setup Tasks As the SYSTEM User"
- Section 2.9, "Performing Setup Tasks As the oracle user"
- Section 2.10, "Setup Tasks for Oracle Products"
- Section 2.11, "Identifying Required Software Directories"
- Section 2.12, "Guidelines for Placing Oracle Recovery Files"
- Section 2.13, "Creating Directories for Oracle Database or Recovery Files"
- Section 2.14, "Stopping Existing Oracle Processes"
- Section 2.15, "Configuring the oracle User’s Environment"
- Section 2.16, "Checking the ORATAB file"

### 2.1 Checking Hardware Requirements

**Note:** Oracle Database 10g must be installed on an ODS-5 formatted disk. Refer to Section 1.2, "Changes and Enhancements" for information about this.

The following sections list the minimum hardware requirements for installing Oracle Database products on an OpenVMS system.

- Section 2.1.1, "Minimum Hardware Requirements"
- Section 2.1.2, "Images"
- Section 2.1.3, "Disk Space Requirements"
2.1.1 Minimum Hardware Requirements

The following are the minimum hardware requirements for installing Oracle Database 10g.

**RAM**

A minimum of 256 MB RAM is required to install Oracle Database products. Oracle Database Client products require 192 MB of RAM.

To determine the amount of RAM installed on the system as well as the amount of paging currently configured on the system, enter the following command:

```bash
$ SHOW MEMORY
```

To review memory reservations on the node, run the following command:

```bash
$ show memory/reserved
```

<table>
<thead>
<tr>
<th>System Memory Resources on 13-JUL-2002 09:57:11.72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Reservations {pages} : Group Reserved In Use Type</td>
</tr>
<tr>
<td>ORA_PROD_SGA                    SYSGBL 5120 0 Allocated</td>
</tr>
<tr>
<td>ORA_PROD_SGA                    SYSGBL 5 0 Page Table</td>
</tr>
<tr>
<td>Total (40.04 Mbytes reserved)    5125 0</td>
</tr>
</tbody>
</table>

**Chip Set**

You must use an hp OpenVMS AlphaServer with EV56 or later generation CPU. Refer to Section 1.2, "Changes and Enhancements" for more information.

**CD-ROM or DVD Drive**

A CD-ROM drive or DVD drive that is supported by OpenVMS is required. Oracle uses ODS-5 format CD-ROM disks.

2.1.2 Images

Two shared images that are linked with client code are built and installed when you link Oracle Database Enterprise Edition.

These new shared images reduce the size of all Oracle Database Client executable images (including precompiled user programs) by removing direct references to Oracle Net Services and other common routines. The image names are in the form of librclntsh.so and oracle.exe.

The ora_java_vms_shr.exe image is the only other image that is installed in OpenVMS memory by default.

2.1.3 Disk Space Requirements

Oracle Universal Installer enables you to select an installation category and type. Your choices determine how much disk space is required. The disk space requirements do not include the size of the database. A production Oracle Database that supports many users requires significant disk space and memory.

See Also:

- Section 2.6.1, "Reserved Memory Registry"
- Hewlett-Packard documentation for more information about reserving memory
Table 2–1 lists the disk space requirements for Oracle Database.

<table>
<thead>
<tr>
<th>Installation Type</th>
<th>Required Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise Edition</td>
<td>4 GB</td>
</tr>
<tr>
<td>Custom</td>
<td>Depends on components selected, but a minimum of 2 GB</td>
</tr>
<tr>
<td>Staging area (copying cd contents to disk)</td>
<td>2 GB</td>
</tr>
</tbody>
</table>

Table 2–2 lists the disk space requirements for Oracle Database Client.

<table>
<thead>
<tr>
<th>Installation Type</th>
<th>Required Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>1.5 GB</td>
</tr>
<tr>
<td>Run time</td>
<td>1.5 GB</td>
</tr>
<tr>
<td>Custom</td>
<td>3 GB</td>
</tr>
</tbody>
</table>

For Oracle interMedia Release 10.1.0.3.0, you must have at least 10 MB of disk space available for the Oracle interMedia Text data dictionary.

2.2 Checking Network Requirements for RAC

Check that you have the networking hardware and IP addresses required for a Oracle Real Application Clusters (RAC) installation.

See Also: For the latest information about supported network protocols and hardware for RAC installations, refer to the Certify screens on the Oracle MetaLink Web site at http://metalink.oracle.com

This section contains the following topics:

- Section 2.2.1, "Network Hardware Requirements"
- Section 2.2.2, "IP Address Requirements"
- Section 2.2.3, "Checking Each Node for Network Requirements"
- Section 2.2.4, "Oracle Net Services Linking Options"
- Section 2.2.5, "Networking and System Management Products"
- Section 2.2.6, "Oracle Advanced Security"

2.2.1 Network Hardware Requirements

Each node in the cluster must meet the following requirements:

- The node must have at least two network adapters, one for the public network interface and one for the private network interface (the interconnect).
- The interface names that are associated with the network adapters for each network must be the same on all nodes.
For increased reliability, you can configure redundant public and private network adapters for each node.

Each network adapter must support TCP/IP.

The private network between the nodes in the clusters is expected to act as a high-bandwidth network for communication between inter-RAC instances.

The public network is expected to provide connections between Oracle Database clients and the RAC instances.

### 2.2.2 IP Address Requirements

Before starting the installation, you must identify or obtain the following IP addresses for each node:

- An IP address and an associated host name registered in the domain name service (DNS) for each public network interface.

- One unused virtual IP address and an associated virtual host name registered in the DNS that you must configure for the primary public network interface.

  The virtual IP address must be in the same subnet as the associated public interface. After installation, you can configure clients to use the virtual host name or IP address. If a node fails, then its virtual IP address fails over to another node.

- A private IP address and an optional host name for each private interface.

  Oracle recommends that you use nonroutable IP addresses for the private interfaces, for example, 10.*.*.* or 192.168.*.*. You can use the local TCP/IP database on each node to associate private host names with private IP addresses.

- One private IP address for each node to serve as the private interconnect.

  This IP address must be separate from the public network, and it must have the same interface name on every node that is part of the cluster.

  During a RAC installation, Oracle Universal Installer displays two screens on which you specify the IP addresses of the private interconnect. The private interconnect is used for internode communication by both Oracle Cluster Ready Services (CRS) and RAC.

  On the Cluster Configuration screen, you must specify a private node name to be associated with each public node name. The public node name is the host name of each node, which is specified as either an alias or an IP address. The private node name is the private interconnect address that will be used by Oracle CRS. In the Private Node Name field, enter the name of the private interconnect if it is available from a network name server or system hosts file, or enter the private IP address, unique to each node.

  The information about the Private Interconnect Enforcement screen is used to determine which private interconnect will be used by RAC database instances. RAC uses all interconnects identified as private on this screen. These interconnects must be in the running state, as in the case if their IP addresses were specified in the `CLUSTER_INTERCONNECTS` logical. RAC does not fail over between cluster interconnects. So, if one cluster is down, then the instances using it will not start.

- One public IP address for each node to serve as the virtual IP address for client connections and for connection failover.

  This is in addition to the public host IP address that is managed and assigned to the node by the operating system. This public virtual IP must be associated with the same interface name on every node that is part of the cluster. In addition, the...
IP addresses that you use for all the nodes that are part of a cluster must be from the same subnet. The host names for the virtual IP must be registered with the domain name server (DNS). The virtual IP address should not be in use at the time of the installation because this is a virtual IP address that Oracle Database manages.

For example, if each node has two public and two private interfaces, you may have the host names and IP addresses on one of the nodes (rac1) and similar host names and IP addresses on the other nodes as shown in Table 2–3.

### Table 2–3 Sample IP Addresses for Each Node

<table>
<thead>
<tr>
<th>Host Name</th>
<th>Type</th>
<th>IP Address</th>
<th>Registered In</th>
</tr>
</thead>
<tbody>
<tr>
<td>rac1.mydomain.com</td>
<td>Public</td>
<td>143.47.43.100</td>
<td>DNS</td>
</tr>
<tr>
<td>rac1-2.mydomain.com</td>
<td>Public</td>
<td>143.46.51.101</td>
<td>DNS</td>
</tr>
<tr>
<td>rac1-vip.mydomain.com</td>
<td>Virtual</td>
<td>143.47.43.104</td>
<td>DNS</td>
</tr>
<tr>
<td>rac1-priv1</td>
<td>Private</td>
<td>10.0.0.1</td>
<td>A local tcp/ip database</td>
</tr>
<tr>
<td>rac1-priv2</td>
<td>Private</td>
<td>10.0.0.2</td>
<td>A local tcp/ip database</td>
</tr>
</tbody>
</table>

#### 2.2.3 Checking Each Node for Network Requirements

To verify that each node meets the network requirements:

1. If necessary, install the network adapters for the public and private networks, and configure them with either public or private IP addresses.

2. Register the host names and IP addresses for the public network interfaces in DNS.

3. For each node, register one virtual host name and IP address in DNS.

4. For each private interface on every node, include the following in the TCP/IP configuration on all nodes, specifying the private IP address and associated private host name as follows:

   ```
   10.0.0.1     rac1-priv1
   ```

5. To identify the interface name and associated IP address for every network adapter, first enter the following command:

   ```
   $SYS$MANAGER:TCPPIP$DEFINE_COMMANDS
   ```

   Then run:

   ```
   $ ifconfig -a
   ```

6. From the output, identify the interface name and IP address for all network adapters that you want to specify as public or private network interfaces.

#### 2.2.4 Oracle Net Services Linking Options

Apply the following guidelines when linking Oracle Net Services:

- The Net Mailbox Adapter (IPC) must be installed. It provides interprocess communications through OpenVMS Mailboxes.

- The Mailbox Adapter can be used to connect an Oracle Database Client and Oracle Database, but only if the tool and the server are on the same OpenVMS system.
Oracle Net Services TCP/IP configurations are available for both OpenVMS clients and servers.

Table 2–4 shows the range of use for Oracle Net Services drivers in client/server and distributed database configurations. The data in this table is based on the assumption that clients in a client/server configuration run Oracle Database Client and that servers run Oracle Database.

For distributed database examples, the clients and servers each run both an Oracle Database Client and Oracle Database.

<table>
<thead>
<tr>
<th>Oracle Net Services Driver</th>
<th>Client/Server RDBMS Server</th>
<th>Distributed RDBMS Client</th>
<th>Distributed RDBMS Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Net Services TCP/IP</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Oracle Net Services OpenVMS Mailbox</td>
<td>Limited</td>
<td>Limited</td>
<td>Limited</td>
</tr>
</tbody>
</table>

**Note:** The range of use for Oracle Net Services drivers for the OpenVMS mailbox is limited only for communication between products in the same Oracle home.

### 2.2.5 Networking and System Management Products

All network products require the underlying software and operating system libraries for the supported network. You must ensure that the network software is installed and running before installing the Oracle Net Services products.

Table 2–5 lists the restrictions and requirements for Oracle Database 10g networking and system management products.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Restrictions and Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Advanced Security Release 10.1.0.3.0</td>
<td>Refer to Section 2.2.6, &quot;Oracle Advanced Security&quot; for information about Oracle Advanced Security authentication support requirements.</td>
</tr>
<tr>
<td>Oracle TCP/IP with SSL Protocol Support</td>
<td>SSL 3.0 or later</td>
</tr>
</tbody>
</table>

### 2.2.6 Oracle Advanced Security

Oracle Advanced Security is an add-on product that is added to the standard Oracle Net Services Server or Oracle Net Services Client. If you purchase it, then install it on both the server and the client. Oracle Advanced Security requires Oracle Net Services release 10.1.0.3.0 and supports Oracle Database 10g release 1 (10.1.0.3.0).

Kerberos and Secure Sockets Layer (SSL) have requirements for authentication protocols that are supported by Oracle Advanced Security. No additional authentication protocol software is required to relink Oracle products. The requirements for Kerberos and SSL are as follows:

- **Kerberos**

  Requires MIT Kerberos version 5 release 1.1. The Kerberos authentication server must be installed on a physically secure system.
SSL

Requires a wallet that is compatible with the Oracle Wallet Manager version 10.1. Wallets that were created by using earlier releases of the Oracle Wallet Manager are not upward-compatible. Oracle Advanced Security provides and installs SSL.

See Also: For more information about Oracle Advanced Security and system management products, refer to Oracle Advanced Security Administrator’s Guide.

Note: No additional authentication protocol software is required to relink Oracle products. However, Oracle does not provide third-party authentication servers (Kerberos, for example). The appropriate authentication server for these protocols must be installed and configured separately.

SSL is provided and is always installed with Oracle Advanced Security.

2.3 Checking Software Requirements

This section provides information about checking the software requirements.

Checking for Required Software

Depending on the products that you intend to install, verify that the following software is installed on the system. The procedure following the table describes how to check these requirements.

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| Operating system | Required version: 
Alpha OpenVMS version 7.3-2 |
| Oracle Spatial | X Window and X/Motif software: 
Note: This software is required only to build the sample programs. |
| Oracle Messaging Gateways | Download the SupportPac MA88 from 
| Pro*C/C++, Oracle XML Developer’s Kit (XDK) | Hewlett-Packard C Compiler Version 6.5-001: 
DTCCMLR |
| | Hewlett-Packard C++ Version 6.5-041: 
CXXBASE 
CXXLIB 
CXXOLD |
To ensure that the system meets these requirements:

1. To determine which version of OpenVMS is installed, enter the following command:

   ```
   $ write sys$output f$getsyi("VERSION")
   V7.3-2
   ```

   In this example, the version shown is V7.3-2. If necessary, refer to the operating system documentation for information about upgrading the operating system.

2. To display additional information about the operating system, enter the following command:

   ```
   $ SHOW SYSTEM /NOPROCESS /FULL
   ```

   To view information about all nodes in a cluster, add the /CLUSTER qualifier to this command.

3. To determine whether Java SDK 1.4.2 is installed, enter the following command:

   ```
   $ dir SYS$COMMON:[SYSMGR]JAVA$142_SETUP.COM
   Directory SYS$COMMON:[SYSMGR]
   JAVA$142_SETUP.COM:1
   Total of 1 file.
   $  
   ```

   As shown in the output, if Java SDK 1.4.2 is installed, then this command displays the script to be run to set up the Java SDK 1.4.2 environment on OpenVMS. Otherwise, the command would return the following output:
Checking Software Requirements

4. If you intend to use Oracle Messaging Gateway and require MQSeries classes for Java and MQSeries classes for Java Message Service (SupportPac MA88), download it from the following IBM Web page:

   http://www-1.ibm.com/support/docview.wss?rs=203&uid=swg24001173

5. If you require a CSD for MQSeries, refer to the following Web site for download and installation information:


6. To determine the version of TCP/IP installed, enter the following command:

   $ tcpip show version

   HP TCP/IP Services for OpenVMS Alpha Version V5.4 - ECO 1 on a AlphaServer
   GS160 6/731 running OpenVMS V7.3-2

Oracle Net Services OpenVMS Mailbox Driver

The Oracle Net Services OpenVMS Mailbox driver (protocol IPC) is included in NETWORK.

You do not need an Oracle Net Services license to use the OpenVMS Mailbox driver.

Checking for Required Patches

You must ensure that the patches described in the following table are installed on the system.

<table>
<thead>
<tr>
<th>Installation Type or Product</th>
<th>Minimum Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>All installations</td>
<td>The following patches, or their later versions, are required:</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_PTHREAD V1.0</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_SYS V5.0</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_UPDATE V2.0 (refer to the note after this table)</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_PCSI V1.0</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_DCL V1.0</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_F11X V1.0</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_RPC V1.0</td>
</tr>
<tr>
<td></td>
<td>■ VMS732_LAN V2.0</td>
</tr>
<tr>
<td></td>
<td>■ TCPIP_ECO V5.4-151</td>
</tr>
<tr>
<td>Oracle Messaging Gateway</td>
<td>Corrective service diskette (CSD) for MQSeries:</td>
</tr>
<tr>
<td></td>
<td>CSD09 or later for MQSeries V5.1</td>
</tr>
</tbody>
</table>

In some cases, later patch sets would cumulatively include earlier patches and therefore, the preceding command would not explicitly indicate the required patch sets. In such cases, check the Patch Distribution Web site of Hewlett-Packard for the contents of the patches that are displayed to verify if the required patches are included or not.
To check if you have the required patches installed on the system, enter the following command:

$ product show history

The output of this command is a list of all software patches or products (or both) that are installed on the system. Verify that you meet the minimum requirements to install and run Oracle Database.

### 2.4 OpenVMS and Installation-Specific Issues and Restrictions

There are factors that can affect the installation or use of Oracle Database. This section discusses these factors:

- Section 2.4.1, "Reinstalling Oracle Database 10g Release 1 (10.1)"
- Section 2.4.2, "New ORA_ROOT"
- Section 2.4.3, "JDK"
- Section 2.4.4, "Devices"

#### 2.4.1 Reinstalling Oracle Database 10g Release 1 (10.1)

If you reinstall Oracle Database server into an ORACLE_HOME where Oracle Database server is already installed, then you must also reinstall any product options, such as Oracle Partitioning, that were enabled before you began the reinstallation.

#### 2.4.2 New ORA_ROOT

Do not install Oracle Database into the root directory of an existing Oracle installation containing any Oracle Software. Oracle recommends that you install Oracle Database products into a new ORA_ROOT.

**Logicals**

Oracle Database 10g release 1 has two separate logicals that specify the top-level directory of the installation. The ORA_ROOT logical is a concealed logical used in earlier releases, and the ORACLE_HOME logical which is a nonconcealed logical. You can use both logicals with the following restriction.

If the top-level directory is DISK$DISK1:[ORACLE10103], then the output obtained by running the show logical command on the ORA_ROOT directory is as follows:

$ show logical ORA_ROOT
DISK$DISK1:[ORACLE10103.]

The output obtained by running the same command on the ORACLE_HOME directory is as follows:

$ show logical ORA_HOME

---

**Note:** If VMS732_UPDATE V3.0 is installed (this is mandated by Hewlett-Packard), then the following patches are covered:

- VMS732_DCL
- VMS732_F11X
- VMS732_LAN
Therefore, the following command is invalid:

$ set default ORA_ROOT

The following commands are valid:

$ set default ORA_ROOT:[000000]
$ set default ORACLE_HOME

2.4.3 JDK

The JDK release that is shipped with Oracle Database is used by Oracle Java applications such as Oracle Universal Installer and is the only Java application that is supported to run with these applications. You must not modify this JRE, unless it is done through a patch provided by Oracle Support Services.

2.4.4 Devices

Oracle Database software must be installed on an On-Disk Structure Level 5 (ODS-5) formatted disk. The data files and redo log files, however, can be placed on ODS-2 formatted disks as well.

Oracle Database server must be able to verify that files have been written to disk. Devices that do not support this verification are not supported for use with Oracle Databases, although Oracle software can be installed on them.

---

**Note:** Because of this requirement for verification, third-party software that creates one or more virtual disks in memory must not be used for data files.

2.5 Creating a User Account

This section provides installation procedure requirements. It discusses the following topics:

- Section 2.5.1, "Oracle Database DBA Account"
- Section 2.5.2, "Adding a Record in the User Authorization File"
- Section 2.5.3, "Setting Account Privileges"
- Section 2.5.4, "Setting Account Quotas"
- Section 2.5.5, "Process Rights for Database Administrators"
- Section 2.5.6, "Process Rights for SGA Protection"
- Section 2.5.7, "Security Issues with Multiple Databases"
- Section 2.5.8, "Completing Account Setup"
- Section 2.5.9, "Verifying Privileges"
- Section 2.5.10, "Setting Permissions for File Creation"
2.5.1 Oracle Database DBA Account

Create an OpenVMS user account to administer and maintain Oracle Database Enterprise Edition installation. Setting up an Oracle Database account is the same as setting up any other OpenVMS user account.

To set up an Oracle Database account:

1. Determine the values that you want to supply to create the account.
2. Run the AUTHORIZE utility to add a record in the User Authorization File (UAF).
3. Use AUTHORIZE to set the following account requirements:
   - Account quotas
   - Account privileges
   - Process rights identifiers
4. Exit AUTHORIZE to complete the account setup.

---

**Note:** Oracle Database account use of OpenVMS resources affects other user processes. Before setting up an Oracle Database account, you must thoroughly understand the reasons for changing system resources at the site.

---

**See Also:** The Hewlett-Packard documentation for more information about running the AUTHORIZE utility

---

**Determining Account Information**

To add an account, you must supply the following information:

- Account name
- Account password
- USER and GROUP numbers for the UIC (octal values)
- Login device and directory
- Owner

Although this guide refers to this account as the Oracle Database account, you can assign any name or number to the account after taking into account UIC restrictions. The Oracle Database account owns the run-time libraries and executable images for every Oracle product. Therefore, the database administrator (DBA) must manage this account and install all Oracle products from it.

---

**Note:** In *Oracle Database Administrator’s Guide* (B10739-01), the Oracle Database account is sometimes referred to as the DBA account. The Oracle Database account is not the same as the SYS or SYSTEM database user names that are created for every database. It is an OpenVMS account name.

---

The UIC group number of the Oracle Database account must be greater than the system parameter MAXSYSGROUP (which defaults to octal 10). Group numbers 1
through the value of MAXSYSGROUP are reserved for use by the OpenVMS operating system.

If the UIC group number is not greater than the value of MAXSYSGROUP, then all Oracle Database account commands are not supported. For example:

- STARTUP
- CREATE DATABASE or CREATE TABLESPACE
- ALTER DATABASE or ALTER TABLESPACE

If the Oracle Database account has a UIC group number that is less than the value of MAXSYSGROUP, then you must create a new account with a UIC group number higher than MAXSYSGROUP before you install Oracle Database.

The following command gives the value of MAXSYSGROUP (in decimal format):

```bash
$ WRITE SYS$OUTPUT $GETSYI("MAXSYSGROUP")
```

2.5.2 Adding a Record in the User Authorization File

Use the AUTHORIZE utility to create or modify records in the UAF as follows:

1. To run the AUTHORIZE utility, enter the following commands:
   
   ```bash
   $ SET DEFAULT SYS$SYSTEM
   $ RUN AUTHORIZE
   ```

2. At the UAF prompt, enter the ADD command to create the user account from which you will install the product software:

   ```bash
   UAF> ADD oracle10g /PASSWORD=ORACLE/UIC=[277,100]-
   /DEVICE=device/DIRECTORY=[oracle10g]/OWNER="ORACLE DBA"
   ```

   In this example, the account name is oracle10g. Note that the UIC group number is 277. The UIC group number must be greater than MAXSYSGROUP.

After adding the account, you must alter the account privileges and quotas. This can be done in any order. However, in most cases, the account privileges are set before the account quotas.

---

**See Also:** The Hewlett-Packard documentation for more information about using the AUTHORIZE utility

2.5.3 Setting Account Privileges

The following privileges are required as both authorized and default privileges for the Oracle Database DBA account:

---

**Note:** An exception is explained in Section 2.5.7, "Security Issues with Multiple Databases".

- CMKRNL
- GROUP
- GRPNAM
- IMPERSONATE
Use the `AUTHORIZE` utility to set the account privileges for the Oracle Database DBA account. At the UAF prompt, use the `MODIFY` command to add the required default and authorized privileges as follows:

```
UAF> MODIFY ORACLE10g -
/PRIVILEGE=(CMKRNL, NETMBX, OPER, PFNMAP, PRMGBL, PRMMBX, SHARE, SYSGBL, -
  SYSNAM, TMPMBX, GROUP, GRPNAM, IMPERSONATE, LOG_IO, WORLD, SYSLCK, SYSPRV) -
/DEFPRIVILEGE=(CMKRNL, NETMBX, OPER, PFNMAP, PRMGBL, PRMMBX, SHARE, SYSGBL, -
  SYSNAM, TMPMBX, GROUP, GRPNAM, IMPERSONATE, LOG_IO, WORLD, SYSLCK, SYSPRV)
```

2.5.4 Setting Account Quotas

Use the `AUTHORIZE` utility to change account quotas to meet the requirements of Oracle Database installation.

**Account Quotas**

`Table 2–6` lists the Oracle Database account quotas, their minimum recommended values, and their equivalent OpenVMS quota names as displayed by the `SHOW PROCESS/QUOTA` and `SHOW WORKING_SET DCL` commands.

---

**Note:** These quotas depend on the number of log files, databases, network connections, and other logicals on the system. You may need to customize these values.

<table>
<thead>
<tr>
<th>Account Quota</th>
<th>Minimum Value</th>
<th>Quota Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTLM</td>
<td>250 (the default)</td>
<td>Asynchronous system trap limit</td>
</tr>
<tr>
<td>BYTLM</td>
<td>750000</td>
<td>Buffered I/O limit</td>
</tr>
<tr>
<td>ENQLM</td>
<td>2000 (the default)</td>
<td>Enqueue quota</td>
</tr>
<tr>
<td>FILLM</td>
<td>2048</td>
<td>Open file quota</td>
</tr>
<tr>
<td>JTQUOTA</td>
<td>8192</td>
<td>Job table quota</td>
</tr>
<tr>
<td>MAXDETACH</td>
<td>0 (the default)</td>
<td>Max detached processes</td>
</tr>
</tbody>
</table>
Modifying the Default Quotas

After adding a record with the default quotas, use the `MODIFY` command to alter the default values. The following example changes the enqueue quota (`ENQLM`) from the default value to a value of 150:

```
UAF> MODIFY ORACLE10g/ENQLM=150
```

### 2.5.5 Process Rights for Database Administrators

The Oracle Database DBA account must be granted one or more process rights identifiers. These identifiers enable you to run the `CONNECT /AS SYSDBA` command that is required to perform database administration functions. Table 2–7 displays the combinations of adding and granting rights identifiers to this account:

**Table 2–7 Adding and Granting Process Rights Identifiers**

<table>
<thead>
<tr>
<th>Adding . . .</th>
<th>And Granting . . .</th>
<th>Enables Control of . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORA_DBA</td>
<td>ORA_DBA</td>
<td>Any database instance, provided it does not also have an ORA_sid_DB identifier defined for it.</td>
</tr>
<tr>
<td>ORA_sid_DB</td>
<td>ORA_sid_DB</td>
<td>Database instance sid only</td>
</tr>
<tr>
<td>ORA_sid_DB</td>
<td>ORA_DBA</td>
<td>All database instances except sid</td>
</tr>
</tbody>
</table>

For example, to grant the `ORA_sid_DB` rights identifier to the Oracle Database account for an instance called TEST, enter the following command:

```
UAF> ADD/IDENTIFIER ORA_TEST_DBA
```

Then, grant the rights identifier to the Oracle Database account as follows:

```
UAF> GRANT/IDENTIFIER ORA_TEST_DBA ORACLE10g
```

If you add the `ORA_TEST_DBA` rights identifier, but grant only `ORA_DBA` to the `oracle10g` account, then the account would have insufficient privileges to administer the TEST instance.

The third row of the table shows that you can add and grant different identifiers, which restricts control of a particular instance while it grants control to other instances.

You can also grant database maintenance privileges to accounts (for example, privileges to start up and shut down the database) other than the Oracle Database account. However, with the Oracle Database account, the user UIC group number must be greater than `MAXSYSGROUP`. By granting the `ORA_sid_DB` identifier, you can similarly restrict user privileges to an instance named `sid`.
2.5.6 Process Rights for SGA Protection

Releases of Oracle Database on OpenVMS after release 7.3.2.3.0 feature a change in the way that the software runs and accesses the System Global Area (SGA). Prior to release 7.3.2.3.2, the SGA was protected by allowing only processes that are running in supervisor mode to access it directly.

Starting with release 7.3.2.3.2, the SGA is protected by an access control list (ACL) to accommodate the kernel remaining in user mode. Before starting a database, add a rights identifier to the UAF.

To do this, the system manager must enter the following command:

```
UAF > ADD/IDENTIFIER/ATTRIBUTES=SUBSYSTEM ORA_SGA
```

**Caution:** Do not grant the ORA_SGA rights identifier to any user. Oracle software manages the assignment of the rights identifier when it starts the database.

2.5.7 Security Issues with Multiple Databases

If a site has several databases managed by different DBAs, then you may not want to grant the CMKRNL privilege to every DBA Oracle Database account. This privilege enables a DBA to activate any process rights identifiers and to install shared images.

For security reasons, Oracle recommends that the OpenVMS system administrator handle these tasks. This person should be responsible for starting Oracle Database instances from a controlled account with a UIC group number that is greater than the value of MAXSYSGROUP. If this is not possible, then at least one Oracle Database must have the CMKRNL privilege.

2.5.8 Completing Account Setup

Exit the AUTHORIZE utility. If the user account that you modified is logged on at the time you exit this utility, then this user must log out and log in again before the changes take effect.

2.5.9 Verifying Privileges

Enter the following command to verify that your account has the correct privileges and rights identifiers:

```
$ SHOW PROCESS/PRIVILEGE
```

2.5.10 Setting Permissions for File Creation

Set default file protections for the oracle10g account to ensure that group and world have READ and EXECUTE permissions, but not WRITE permission, on installed files.

1. Enter the $SHOW PROTECTION command to check the current setting.

2. If the $SHOW PROTECTION command does not show the expected protection, then set protection in the login.com of the oracle10g account as follows:

```
$ SET PROTECTION=(s:RWE, o:RWED, g:RE, w:RE)/default
```
2.6 OpenVMS SYSGEN Parameters

You can create and use reserved memory on an OpenVMS system. The following sections describe the utilities that you can use to set the values of the various SYSGEN parameters:

- Section 2.6.1, "Reserved Memory Registry"
- Section 2.6.2, "AUTOGEN"

2.6.1 Reserved Memory Registry

Through its interface within the SYSMAN utility, the reserved memory registry enables you to configure an OpenVMS system with large amounts of memory set aside for use within memory-resident global sections. The AUTOGEN utility considers the preallocated reserved memory when it tunes the system.

Oracle recommends that you do not use reserved memory until the instance SGA size is stable. In most cases, this is a few weeks after the database is performing well.

The advantages to reserving memory for an SGA are as follows:

- You can be certain that the memory is available and that the system is correctly tuned.
- The memory is reserved at startup time as contiguous aligned physical pages. This enables the system to optimize the mapping of the SGA.
- The memory is preallocated and zeroed. This results in faster SGA mapping and faster instance startup.

To reserve memory for an SGA, use the SYSMAN utility. The size qualifier is specified in megabytes. For example, to reserve memory for a 6 GB SGA for the SID named TEST, use the following commands:

```bash
$ MCR SYSMAN
SYSMAN> RESERVED_MEMORY ADD ORA_TEST_SGA/SIZE=6144/ALLOCATE/ZERO/PAGE
SYSMAN> EXIT
```

Next, run AUTOGEN and restart the system to allow AUTOGEN to adjust other system parameters for the reduced amount of memory that is available to the rest of the system.

Memory for multiple SGAs may be reserved. Any change to the name or size of a piece of reserved memory may require restarting the system. During instance startup, Oracle Database compares the size of the reserved memory, if any, with the size of the SGA. If appropriate, one of the following messages is included in the alert log:

```
** Reserved memory size = size greater than created SGA size = size**
** Please reduce reserved memory size to avoid wasting memory. **
** Memory was not reserved for the SGA. SGA size = size **
** There might be performance advantages to allocating memory for the SGA in the VMS reserved memory registry. **
```

If the memory reserved for an SGA is insufficient, then the instance startup fails. In this case, you must adjust the amount of reserved memory, run AUTOGEN, and restart.
the system. For example, to expand the SGA to 6.5 GB for the TEST instance, enter the following commands:

```
$ MCR SYSMAN
SYSMAN> RESERVED_MEMORY REMOVE ORA_TEST_SGA
SYSMAN> RESERVED_MEMORY ADD ORA_TEST_SGA/SIZE=6656/ALLOCATE/ZERO/PAGE
SYSMAN> EXIT
```

Next, run AUTOGEN and file the system in the UAF.

If you do not want to file the system in the UAF, then you can use SYSMAN to free the memory reservation, and then start the instance. The risk involved with this is that the system may not have enough fluid pages to create the SGA. In addition, the performance advantages of using reserved memory are not available.

---

**See Also:** The Hewlett-Packard documentation for more information about the reserved memory registry

---

To review memory reservations on the node, run the following command:

```
$ show memory/reserved
```

<table>
<thead>
<tr>
<th>Memory Reservations (Pages)</th>
<th>Group</th>
<th>Reserved</th>
<th>In Use</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORA_PROD_SGA</td>
<td>SYSBL</td>
<td>5120</td>
<td>0</td>
<td>Allocated</td>
</tr>
<tr>
<td>ORA_PROD_SGA</td>
<td>SYSBL</td>
<td>5</td>
<td>0</td>
<td>Page Table</td>
</tr>
<tr>
<td>Total (40.04 Mbytes reserved)</td>
<td></td>
<td>5120</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

---

**2.6.2 AUTOGEN**

Because SYSGEN parameters affect the entire operating system, the system administrator is the only person who should modify them. At some sites, the DBA and system administrator may be the same person. The instructions in this section are directed to the system administrator.

For setting or modifying SYSGEN parameters, OpenVMS provides the AUTOGEN utility. You can also use SYSGEN, but this is an older utility and its use is discouraged, except perhaps for checking current values. You must have the SYSPRV or BYPASS privilege to run these utilities.

AUTOGEN provides a permanent method for setting parameters, and it documents all changes. AUTOGEN also lets you recalculate any parameters that depend on other parameters that you may have changed. Remember to record parameter values before changing them, and determine in advance what results you expect from the changes you make. If the expected changes do not occur, then restore the old values before trying again.

The procedure is as follows:

1. Run the AUTOGEN utility with the SAVPARAMS parameter by entering the following command:

   ```
   $ @SYS$UPDATE:AUTOGEN SAVPARAMS GETDATA
   ```

   This step saves current parameters to a file named AGEN$FEEDBACK.DAT.

2. If you have not already done so, run AUTOGEN GETDATA to ensure that the file PARAMS.DAT has been generated.

   ```
   $ @SYS$UPDATE:AUTOGEN GETDATA
   ```
3. Examine the parameter settings in the current `PARAMS.DAT`, and if they are correct, then change them in the `MODPARAMS.DAT` file by using the `MIN_parameter=value` format as follows:

```
MIN_GBLSECTIONS=3000
MIN_GBLPAGES=300000
```

The `MIN` prefix indicates that you are setting a lower limit for the specified parameter. To use the `MIN` prefix, identify the current value of the specified parameter (using `SYSGEN`) and the amount by which you want to increase the parameter. The sum of these two values is used for the `MIN_parameter` entry.

4. Run the `AUTOGEN` utility with the `GENPARAMS` and `REBOOT` parameters by entering the following command:

```
$ @SYS$UPDATE:AUTOGEN GENPARAMS REBOOT
```

**Caution:** The `REBOOT` parameter in this example causes the system to automatically restart when the `SYSGEN` is complete.

This step generates new `SYSGEN` parameters in a file named `SETPARAMS.DAT` and runs the `SYSGEN` utility to set these parameter values as specified in the file.

**See Also:** `OpenVMS System Management Utilities Reference` for more information about using the `AUTOGEN` utility

### 2.7 OpenVMS System Configuration

If the system fails to satisfy any listed requirement, then perform the tasks listed in the next section as necessary to configure the system to meet these requirements.

Table 2–8 lists the requirements for installing Oracle Database.

<table>
<thead>
<tr>
<th>System Factors</th>
<th>Requirements for Oracle Database</th>
</tr>
</thead>
</table>
| OpenVMS Parameters: Minimum Global Pages or Sections | Verify that the values for `MIN_GBLPAGES` and `MIN_GBLSECTIONS` are greater than, or equal to, the values that were calculated for these parameters, as documented in `READMEVMS.DOC`.
| OpenVMS Accounts                | You need an OpenVMS account that is dedicated solely to installing and upgrading Oracle products. The instructions in this book are provided with the assumption that the account is called `oracle10g`.
| Permissions for File Creation   | Default Protections              |

### 2.8 Performing Setup Tasks As the SYSTEM User

Log in as the `system` user and perform the following tasks to set up the environment for Oracle Database:

- Section 2.8.1, "Creating an Oracle Software Account"
- Section 2.8.2, "Creating an Apache Server Account"
2.8.1 Creating an Oracle Software Account

The oracle account is the OpenVMS user account that owns Oracle Database software after installation. Run Oracle Universal Installer with this user account.

Use the AUTHORIZE utility to create an oracle account with the properties listed in Table 2–9.

<table>
<thead>
<tr>
<th>Account</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Login Name</td>
<td>Any name, but this document refers to it as the Oracle Database account.</td>
</tr>
<tr>
<td>UIC</td>
<td>The group UIC number, which must be greater than MAXSYSGROUP.</td>
</tr>
<tr>
<td>Home Directory</td>
<td>Select a home directory consistent with other user home directories. The home directory of the oracle10g account does not need to be the same as the ORA_ROOT directory.</td>
</tr>
</tbody>
</table>

**Caution:** Use the oracle account only for installing and maintaining Oracle software. Do not use it for purposes unrelated to Oracle Database server. Do not use SYSTEM as the oracle10g account.

Sites with multiple ORA_ROOT directories on one system may install Oracle software with the same oracle10g account, or separate accounts. Each oracle10g account must have the same group UIC.

2.8.2 Creating an Apache Server Account

The Apache account is an OpenVMS user account that owns the Apache server after installation. If you use a default Apache configuration (one that listens to ports lower than 1024, which are reserved for the system), then Oracle recommends, for security reasons, that a separate account owner be set up for Apache. Configure the Apache server to assign the ownership of listener and module actions to this account. It is not necessary for the Apache user account to have privileges to run the Apache Server on a port numbers that are lower than 1023. Images that are linked with privileges during installation in the oracle account ensure that this can be done.

For information about how to configure the server to run as a user other than the 'oracle' user, refer to Section H.3.3, "Customizing the Server Environment".

The Apache account owner should have minimal user privileges, and should not be a member of any groups where files are not intended to be visible to the public. The nobody account may serve as a model for the Apache account.

2.9 Performing Setup Tasks As the oracle user

Log in to the oracle account and perform the following tasks as necessary:

- Section 2.9.1, "Setting the Display"
- Section 2.9.2, "Setting Up a Batch Queue for the EMAgent and HAS"
2.9.1 Setting the Display

Before starting Oracle Universal Installer, set the display by using the following command:

```
$ SET DISPLAY/CREATE/TRANSPORT=TCP/IP/NODE=workstation_name or IP_address
```

Verify that you have set the display correctly by using the following command:

```
$ RUN SYS$SYSTEM:DECW$CLOCK
```

Refer to each logical entry in this section for instructions on setting the logical correctly.

---

**Note:** If an Oracle Database already exists on the system, then its settings may have a bearing on the settings that you select for the new environment.

---

Do not use the host name or IP address of the system where you install the software unless you perform the installation from the X Window console of that system. Use the computer name or IP address of the workstation if you are installing from a remote system. If you are not sure of the X server and screen settings, then use 0 (zero) for both.

2.9.2 Setting Up a Batch Queue for the EMAgent and HAS

In this release, the architecture and implementation of the Enterprise Manager Agent has undergone a major revision. The new agent is based on an HTTP listener that communicates with the Management Server using XML and that uses Perl to perform a number of tasks. This has been implemented to run in a batch queue instead of running as detached processes. The Enterprise Manager Agent runs a main process. To support monitoring of both internal (using the same Oracle home) and external databases and listeners, the Enterprise Manager Agent submits additional batch jobs.

From the operational and management perspective, this has been implemented to run under a batch queue to get a better collective view of all processes related to the Enterprise Manager Agent running at any given time. This makes it easy to monitor and control all processes spawned by the Enterprise Manager Agent. In addition, it may be possible to delete batch jobs or processes that can potentially fail when trying to connect to databases or listeners that are not running.

For High-Availability Services (HAS), the CRS daemons, OCSSD, EVMD, and CRSD, are collectively run as batch process. The EMAgent and HAS use the following method to determine the name of the batch queue on which to submit jobs:

- If the `ORA_BATCH_QUEUE_hostname` logical is defined, then the value of this logical is used.
- If the `ORA_BATCH_QUEUE_hostname` logical is itself a valid queue name, then it is used.

The `ORA_BATCH_QUEUE_hostname` logical need not always be defined. It is sufficient that it is defined at least once during installation. Alternatively, you can define it before running `ORAUSER.COM` at any time after the installation. Note that the Enterprise Manager Agent and HAS services can only be started up after setting up this batch queue logical and running `ORAUSER.COM`.

The two components record the batch queue name in the installation, and use that as a reference for subsequent calls to the services. The default batch queue `SYSS$BATCH`
generally points to a batch queue that runs under a lower priority (usually, 2) than the priority of a normal user (usually, 4). Therefore, it is inappropriate to use the default queue for the two services. This would result in poor and, in some cases, defective performance of the two services.

2.10 Setup Tasks for Oracle Products
The following products require preinstallation steps to be completed before you install Oracle Database software:

- Section 2.10.1, "Precompilers and Tools"
- Section 2.10.2, "Network and System Management Products"

2.10.1 Precompilers and Tools
The following sections list the preinstallation tasks for the precompilers and tools that are required for OpenVMS.

2.10.1.1 Pro*Cobol Restriction
The use of incorrectly aligned binary data (such as COMP-1) in Pro*COBOL applications will generate unaligned access warnings that will prevent optimum compiler performance. However, the application results are not affected.

2.10.1.2 JDK
The Java Development Kit (JDK) that is certified for use with Oracle Database software is used by Oracle Java applications such as Oracle Universal Installer and is the only Java application supported to run with these applications. Do not modify this JDK unless you use a patch that is provided by Oracle Support Services.

2.10.2 Network and System Management Products
This section describes tasks that need to be completed prior to installation if you have existing network and system management products.

2.10.2.1 Setup Tasks for Oracle Net Services
If you have an existing installation of Oracle Net Services server, then shut down all listeners before installing Oracle Net Services. To determine if any listeners are running, enter the following command:

```bash
$ lsnrctl status [listener_name]
```

The `listener_name` field is required if the listener has a name other than the default name listener.

To shut down a running listener, enter the following command:

```bash
$ lsnrctl stop listener_name
```

2.10.2.2 Verify Oracle Supported Protocols
Oracle Universal Installer automatically installs the TCP/IP protocol with all Oracle Database installations. Before installing any protocol, verify that the underlying network is functioning and is configured properly.

To verify that the network is functioning properly, transfer and retrieve a test file using the `ftp` utility by entering the following commands:
2.11 Identifying Required Software Directories

You must identify or create three directories for the Oracle software as described in the following sections:

- Section 2.11.1, "Oracle Inventory Directory"
- Section 2.11.2, "CRS Home Directory"
- Section 2.11.3, "Oracle Home Directory"

The following subsections describe the requirements for these directories.

2.11.1 Oracle Inventory Directory

The Oracle inventory directory (oraInventory) stores an inventory of all Oracle software installed on the system. It is required by, and shared by, all Oracle software installations on a single system. The first time you install Oracle software on a system, Oracle Universal Installer prompts you to specify the path to this directory.

The Installer creates the directory that you specify and sets the correct owner, group, and permissions on it. You do not need to create it.

---

**Note:** All Oracle software installations rely on this directory. Ensure that you back it up regularly. Do not delete this directory unless you have completely removed all Oracle software from the system.

---

2.11.2 CRS Home Directory

The CRS home directory is the directory where you install the software for Oracle Cluster Ready Services. You must install CRS in a separate home directory. When you run Oracle Universal Installer, it prompts you to specify the path to this directory as well as a name that identifies it. Oracle recommends that you specify a path similar to the following for the CRS home directory:

```
device:[oracle.crs_home101]
```

2.11.3 Oracle Home Directory

The Oracle home directory is the directory where you choose to install the software for a particular Oracle product. You must install different Oracle products, or different releases of the same Oracle product, in separate Oracle home directories. When you run Oracle Universal Installer, it prompts you to specify the path to this directory, as well as a name that identifies it.

Oracle Universal Installer creates the directory path that you specify. It also sets the correct owner, group, and permissions on it. You do not need to create this directory.
2.12 Guidelines for Placing Oracle Recovery Files

Use the following guidelines to place Oracle Database or recovery files:

■ To prevent disk failure from making both the database files and the recovery files unavailable, place the recovery files on a different physical disk from the database files.

■ The disk that you select must have at least 2 GB of free space.

The disk space requirement is the default disk quota configured for the flash recovery area. The default disk quota is specified by the `DB_RECOVERY_FILE_DEST_SIZE` initialization parameter. If you select the Custom installation type, then you can specify a different disk quota value. After you create the database, you can also use Oracle Enterprise Manager Grid Control to specify a different value.

See Also: Oracle Database Backup and Recovery Basics (B10735-01) for more information about sizing the flash recovery area

■ The `oracle` user must have write protection to create the files in the specified path.

2.13 Creating Directories for Oracle Database or Recovery Files

Use the following guidelines when deciding the location of Oracle Database or recovery files.

■ You can choose either a single device or more than one device to store the database files depending on the following criteria.
  
  ◦ If you want to use a single device, then choose a device on a physical device that is dedicated to the database.

  For performance and reliability, choose a redundant array of independent disks (RAID) device or a logical volume on more than one physical device and implement the stripe-and-mirror-everything (SAME) methodology.

  ◦ If you want to use more than one device, then choose devices that are dedicated to the database.

  This method enables you to distribute physical I/O and create separate control files on different devices for increased reliability. You must choose either the Advanced database creation option or the Custom installation type during the installation to implement this method.

■ If you intend to create a preconfigured database during the installation, the device (or devices) that you choose must have at least 1.2 GB of free disk space.

For production databases, you must estimate the disk space requirement depending on the use you want to make of the database.

■ For optimum performance, the devices that you choose should be used only by the database.
■ The oracle user must have write permissions to create the files in the path that you specify.

Creating Required Directories

**Note:** You must complete this procedure only if you want to place Oracle Database or recovery files on a separate device instead of placing them in the Oracle home directory.

To create directories for Oracle Database or the recovery files on separate devices:

1. Use the `show device device_name` command to determine the free disk space on each mounted device.
2. From the display, identify the devices that you want to use. Table 2–10 lists the device requirements for recovery files.

<table>
<thead>
<tr>
<th>File Type</th>
<th>Device Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data files</td>
<td>Choose either:</td>
</tr>
<tr>
<td></td>
<td>■ A single device with at least 1.2 GB of free disk space</td>
</tr>
<tr>
<td></td>
<td>■ Two or more devices with at least 1.2 GB of free disk space in total</td>
</tr>
<tr>
<td>Recovery files</td>
<td>Choose a device with at least 2 GB of free disk space.</td>
</tr>
</tbody>
</table>

If you are using the same device for more than one type of file, then add the disk space requirements for each type to determine the total disk space requirement.

3. Note the names of the root device directories for the devices that you identified.

### 2.14 Stopping Existing Oracle Processes

**See Also:** Oracle Database Administrator’s Reference (B13738-01) for information about stopping existing Oracle processes on RAC

**Caution:** If you are installing additional Oracle Database 10g products in an existing Oracle home, then stop all processes running in the Oracle home. You must complete this task to enable Oracle Universal Installer to relink certain executables and libraries.

If you choose to create a database during the installation, then most installation types configure and start a default Oracle Net Services listener using TCP/IP port 1521 and the IPC key value `EXTPROC`. However, if an existing Oracle Net Services listener process uses the same port or key value, Oracle Universal Installer can only configure the new listener, but it cannot start it. To ensure that the new listener process starts during the installation, you must shut down any existing listeners before starting Oracle Universal Installer.

To determine if an existing listener process is running, and to shut it down if necessary:

1. Log in as the oracle user.
2. Enter the following command:

```
$ pipe show system/own=oracle | search sys$input ORA_LISTENER
```

This command displays the Oracle processes that are running in the oracle account. Run the following command to identify the Oracle processes that are running as listener processes:

```
$ write sys$output f$getjpi(pid,"IMAGENAME")
```

For each process that is running as a listener process, run the following command to determine the Oracle home in which it is running:

```
$ show process/continuous process_name
```

In this example, `process_name` is the name of the listener process that is indicated by the command that you just entered.

**Note:** If no Oracle Net Services listeners are running, then refer to Section 2.15, "Configuring the oracle User’s Environment" to continue.

3. Set up the Oracle environment for the Oracle home area where the listener is running as follows:

```
$ set def Oracle_home_dir
$ @orauser
```

4. Enter the following command to identify the TCP/IP port number and IPC key value that the listener is using:

```
lsnrctl status listenername
```

**Note:** If the listener uses the default name LISTENER, you do not have to specify the listener name in this command.

5. If the TCP/IP port number determined in the preceding step is 1521, or the IPC key value is EXTPROC, then enter a command similar to the following:

```
lsnrctl stop listenername
```

6. Repeat this procedure to stop all listeners running on this system.

**See Also:** Appendix I for a list of commands that you can use when performing this procedure

### 2.15 Configuring the oracle User’s Environment

Before you start Oracle Universal Installer, you must configure the environment of the oracle user.

To configure the oracle user’s environment, perform the following steps:

1. Start a new terminal session.
2. Set up display using the `set display` command.
3. Set up logical `ORACLE_HOME` in OpenVMS syntax.
4. Set up the TMP directory and define TMP logical in UNIX-style syntax.

5. Set up the inventory directory, and create the oraInst.loc file.

6. Define logical ORA_BATCH_QUEUE_nodename to point to an existing batch queue.

   See Also: Appendix E, "Installing, Configuring, and Running EMAgent" for more information about batch queues

7. Create a file, cluster_nodes.dat, in the sys$login directory with the list of nodes that are to comprise the RAC cluster. This file displays each node on a separate line with the primary node listed first.

8. Enter the $ set noverify command.

9. Enter the $ set process/priv=all command.

10. Start the runInstaller script as follows:

    $ @ora_root:[oui.bin]runinstaller.com

### 2.16 Checking the ORATAB file

The ORATAB file contains information about all Oracle installations and databases installed on the node. This information is used to discover Oracle product installations. When an Oracle product is installed, this file is updated with information about the new Oracle home. If this file is not found, then a new ORATAB file is created.

To check if the ORATAB file exists:

1. Check for the ORATAB file in the sys$login/hostname directory. For example:

   DISK:[mylogin.hostname]ORATAB.

2. If the ORATAB file is not found at the location described in Step 1, then use the file in the sys$login directory. For example:

   DISK:[mylogin]ORATAB.

3. If the ORATAB file is not found in any of the preceding locations, then it means there is no ORATAB file.
This chapter describes how to start Oracle Universal Installer and install Oracle products on the system. It includes information about the following topics:

- Section 3.1, "Installation Overview"
- Section 3.2, "Downloading Oracle Software from the Oracle Technology Network Web Site"
- Section 3.3, "Installing Oracle Database Software"
- Section 3.4, "Installing Oracle Database Client"
- Section 3.5, "Reviewing the Log of an Installation Session"
- Section 3.6, "Noninteractive Installation and Configuration"
- Section 3.7, "Cleaning Up After a Failed Installation"

**Note:** Review the information in Chapter 1, "Installation Overview" and complete the tasks listed in Chapter 2, "Preinstallation Tasks" before beginning the installation.

### 3.1 Installation Overview

Oracle Database software is available on discs (CD-ROM or DVD) or you can download it from the Oracle Technology Network Web site. In most cases, you use the graphical user interface (GUI) provided by Oracle Universal Installer to install the software. However, you can also use Oracle Universal Installer to complete noninteractive installations without using the GUI. Refer to Appendix B for information about noninteractive installations.

**Note:** If Oracle Database software is on two discs, then you can avoid having to change discs during the installation by running Oracle Universal Installer from the DVD or by copying the contents of the installation discs to a hard disk.

This chapter describes how to install Oracle Database from the product media or from the hard disk. To install the software from the hard disk, you must either download it from Oracle Technology Network and unpack it, or copy it from the discs if you have them. Refer to one of the following sections, depending on the method that you want to use:
3.2 Downloading Oracle Software from the Oracle Technology Network Web Site

This section describes how to download the installation archive files and extract them on your hard disk. It includes the following topics:

- Section 3.2.1, "Downloading the Installation Archive Files"
- Section 3.2.2, "Extracting the Installation Files"

3.2.1 Downloading the Installation Archive Files

To download the installation archive files from Oracle Technology Network:
1. Use any browser to open the software download page on the Oracle Technology Network at
   \[http://www.oracle.com/technology/\]

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

3. On the download screen, identify the required disk space by adding the file sizes for each required file.
   The file sizes are listed next to the file names.

4. Select a device with enough free space to store and expand the archive files.
   In most cases, the available disk space must be at least twice the size of all of the archive files.

5. On the device that you select in Step 4, create a parent directory for each product, for example \texttt{OraDB10g}, to hold the installation directories.

6. Download all the installation archive files to the directory that you created in Step 5.

7. Verify that the files you downloaded are of the same size as the corresponding files on the Oracle Technology Network Web site.

\subsection*{3.2.2 Extracting the Installation Files}

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

1. Navigate to the directory that contains the downloaded installation archive files.

2. To uncompress each file, enter a command similar to the following:
   \[
   \$\text{ jar -xvf filename}
   \]
   This command creates files with names similar to the following:
   \texttt{filename.bck}

3. Start Oracle Universal Installer from the \texttt{disk1} directory on the hard disk. Oracle Universal Installer automatically finds the contents of each CD-ROM and does not prompt for the location of any CD-ROM during the course of the installation.

\section*{3.3 Installing Oracle Database Software}

You can install Oracle Database either from the hard disk or from CD-ROM. The following sections describe the methods for installing Oracle Database from these media.

- \texttt{Section 3.3.1, "Installing Oracle Database from the Hard Drive"}
- \texttt{Section 3.3.2, "Installing Oracle Database from CD-ROM"}

\subsection*{3.3.1 Installing Oracle Database from the Hard Drive}

You can avoid the need to mount and unmount CD-ROMs during installation by copying the contents of each CD-ROM to an On-Disk Structure Level 5 (ODS-5) formatted disk. You must have enough disk space available, depending on the type of install.

1. If required, set up an X Window environment by using the following DCL command:
Installing Oracle Database Software

2. Copy the CD-ROMs to the system hard disk. Copy the contents of CD-ROM number 1 to a directory named disk1. Copy the contents of CD-ROM number 2 to a directory named disk2. The disk1 and disk2 directories must have the same parent directory. Use the following example commands to set up a staging area. Use an ODS-5 disk. Replace dqa0 with the name of the CD-ROM reader and oracle10g with the OpenVMS account that you are using to install Oracle Database. For example, you may perform the following steps:

   $ create/dir disk$alpha1:[10gkit]/owner=oracle10g
   $ set def disk$alpha1:[10gkit]
   $ create/dir [.disk1]/owner=oracle10g
   $ create/dir [.disk2]/owner=oracle10g
   $ mount/over=ident dqa0 ! mount CD reader with CD # 1 loaded
   $ set def [.disk1]
   $ set proc/parse=extended
   $ show default           ! verify that you are in the disk1 directory
   $ copy/read/write dqa0:[000000...]*.*;* [...]
   $ dismount dqa0
   $ mount/over=ident dqa0 ! mount CD reader with CD # 2 loaded
   $ set def [-.disk2]
   $ show default             ! verify that you are in the disk2 directory
   $ copy/read/write dqa0:[000000...]*.*;* [...]

The software is now staged on disk and ready for installation using Oracle Universal Installer.

3. Start Oracle Universal Installer from the disk1 directory on the hard disk. Oracle Universal Installer automatically finds the contents of each CD-ROM and does not prompt for the location of any CD-ROM during the course of the installation.

4. To continue with the installation process, complete Step 3 through 14 in Section 3.3.2.2, "Installing Oracle Database".

3.3.2 Installing Oracle Database from CD-ROM

If required, set up an X Window environment by using the following DCL command:

   SET DISPLAY/CREATE/TRANSPORT=TCPIP/NODE=workstation_name or IP_address

The following procedure describes the installation of products with the use of the CD-ROMs and Oracle Universal Installer.

- Section 3.3.2.1, "Installation Mount Options"
- Section 3.3.2.2, "Installing Oracle Database"
- Section 3.3.2.3, "Completing Oracle Database Server Enterprise Edition Installation"

3.3.2.1 Installation Mount Options

If you run Oracle Universal Installer while the current working directory is in the CD-ROM, then perform the following steps to mount the next CD-ROM:

Mounting and Unmounting the Oracle Database CD-ROM

Mount the Oracle Database CD-ROM. For example:

   $ MOUNT/OVERRIDE=IDENTIFICATION ddcn
where:

ddcn is a valid CD-ROM device.

---

**Caution:** Oracle does not support using Oracle Universal Installer that is shipped with release 9.2 to install Oracle Database 10g components.

---

**Switching Between CD-ROMs**

The information in this section is based on the assumption that you mounted CD-ROM number 1 from the OpenVMS terminal session that was used to start Oracle Universal Installer.

When Oracle Universal Installer prompts you to insert CD-ROM number 2 (10103_vms_1 disk 2), perform the following steps from the OpenVMS terminal session:

1. Press the Enter key a few times on the OpenVMS terminal session. This should get you to a DCL prompt.
2. Run the following command, in which ddcn is the CD-ROM reader.
   
   `$ dismount ddcn !`
3. Remove CD-ROM number 1, and insert CD-ROM number 2 in the CD-ROM reader.
4. Run the following command, in which ddcn is the CD-ROM reader.
   
   `$ mount/over=ident ddcn`

Click **OK** on the Oracle Universal Installer screen on which you were prompted to insert 92020_vms_1 disk 2.

**3.3.2.2 Installing Oracle Database**

To install Oracle Database from the CD-ROM:

1. Log in as the oracle user.

2. Start Oracle Universal Installer from the CD-ROM mount-point directory at the SYSTEM directory level with the following command:
   
   `$ @ddcn:runInstaller`

   If the default temp directory (SYS$SCRATCH) is not ODS-5, then you must use the `-scratchPath` flag to specify an alternate temporary directory. For more information about ODS-5 format requirements, refer to Section 1.2, "Changes and Enhancements".

   `$ @ddcn:runInstaller -scratchPath ODS5_temp_dir`

   After Oracle Universal Installer is started, the Welcome screen is displayed. Click **Next** to continue the installation.

3. The Inventory Location screen is displayed if this is the first time that any Oracle Database product is being installed on the system.
   a. Enter a directory where the inventory of all installations should be kept.
b. If this is not the first time any Oracle Database products are installed on the current system, then go to the next step.

c. Click Next to continue the installation.

4. The File Locations screen is displayed.

a. **Source:** You need not change the default. This points to the installation files.

b. **Destination (Name):** Enter a name to refer to the Oracle home.

c. **Destination (Path):** Enter the path of the Oracle home.

**Note:** ORACLE_HOME must be on an ODS-5 disk.


d. Click Next

5. The Available Products screen is displayed.

a. Select Oracle Database.

b. Click Next to continue.

6. The Installation Types screen is displayed.


b. Click Next.

7. The Database Configuration screen is displayed.

a. Select a database that is suited to your needs.

b. Click Next.

8. The Database Identification screen is displayed.

a. The **Software Only** option will not install the starter database.

   If you select this option, the next step will use the Enable Real Application Clusters screen (Step 12).

b. Click Next.

9. The Database Identification screen is displayed.

a. Enter a value for the **Global Database Name** for this database.

b. Enter a value for the system identifier (SID).

**Note:** The System Identifier (SID) must contain no more than 6 characters on OpenVMS-based systems.

c. Click Next.

10. The Datafiles Location screen is displayed. Enter a path for the location of the data files. Click Next.

11. The Database Character Set screen is displayed. Select the desired character set. Click Next.
12. The Enable Real Application Clusters (RAC) screen is displayed. Select Yes if you wish to enable RAC.

13. The Install screen is displayed. This screen indicates installation progress. Any errors or warnings are displayed in a dialog box where you can select to fix and retry, to ignore and continue, or to quit.

   a. If you chose to install Software Only, then the End of Installation screen is displayed next.

   b. If you chose to install a starter database, then the Configuration Tools screen is displayed, followed by the Database Configuration Assistant screen.

   c. When configuration is complete, the End of Installation screen is displayed.

14. From the End of Installation screen, you may exit or install additional products.

   a. This screen is displayed when the installation is complete. You may choose to exit Oracle Universal Installer or to begin another installation:

   b. Click Exit to end Oracle Universal Installer session.

   c. Click Next Install to begin another installation without stopping and restarting Oracle Universal Installer.

3.3.2.3 Completing Oracle Database Server Enterprise Edition Installation

If no errors occur during installation, then the installation is complete. To create a database instance, use the Database Configuration Assistant (DBCA).

See Also: Section 4.1, "DBCA"

3.4 Installing Oracle Database Client

To install Oracle Database Client:

1. Log in as the oracle user.

2. Start Oracle Universal Installer from the Oracle Database Client CD-ROM directory at the SYSTEM directory level with the following command:

   $ @ddcn:runInstaller

   If the default temp directory (SYS$SCRATCH) is not ODS-5, then you will need to use the -scratchPath flag to specify an alternate temporary directory. For more information about the use of ODS-5 format, refer to Section 1.2, "Changes and Enhancements".

   $ @ddcn:runInstaller -scratchPath ODS5_temp_dir

3. After Oracle Universal Installer starts, the Welcome screen is displayed. Click Next to continue the installation.

4. The Inventory Location screen is displayed.

   a. If this is the first time that any Oracle Database products are installed on the current system, then the Inventory Location screen is displayed. Enter a directory where an inventory of all installations should be kept.

   Note: This directory must be on an ODS-5 disk.
b. If this is not the first time any Oracle Database products are installed on the current system, then refer to the next step.

5. The File Locations screen is displayed.
   a. **Source:** You should not need to change the default. This points to the installation files.
   b. **Destination (Name):** Enter a name to refer to the Oracle home.
   c. **Destination (Path):** Enter the path for the Oracle home.

   **Note:** The Oracle home must be on an ODS-5 disk.

   d. Click Next.

6. The Available Products screen is displayed. Select **Oracle Database Client**. Click **Next** to continue.

7. The Installation Types screen is displayed. Select an installation type: Custom, Administrator, or Runtime, and then click **Next**.

8. The Summary screen is displayed. This screen displays all of the options that you select for the installation. Click **Install** to proceed with the installation, or click **Previous** to change your selections.

9. The Instal screen is displayed. This screen indicates installation progress. Errors or warnings are displayed in a dialog box where you can choose to fix and retry, to ignore and continue, or to quit.

10. From the End of Installation screen, you can exit or install additional products. This screen is displayed when the installation is complete. You can exit Oracle Universal Installer or begin another installation:
    a. Click **Exit** to end this session with Oracle Universal Installer.
    b. Click **Next Install** to begin another installation without stopping and restarting the Installer.

**Oracle Database Custom Installation**

If you select the Custom Installation option, the Available Product Components screen is displayed. It lists all the products and components that are available for installation. A typical custom installation configuration is selected by default. Some actions that may differ from a standard installation are:

1. Select the products that you want to install, or deselect the products that you do not want to install, and click **Next**.

2. Provide responses to any screen prompts that are displayed.
   With custom selection of products, you may want to change default values for items such as: port numbers, product-specific directory names, or Rdb gateway attributes.
   
   In the end, the Summary screen is displayed.

### 3.5 Reviewing the Log of an Installation Session

Oracle Universal Installer creates the **oraInventory** directory the first time that it is run on a computer. It does this to keep an inventory of products that it installs on the system as well as an inventory of other installation information.
The location of the OraInventory directory is defined in the OraInst.loc file, which is located in the sys$login directory or in the location specified by the -invPtr switch at the command line. An inventory is created the first time that an Oracle Universal Installer installation is performed on a particular system. The inventory is then detected and referenced during subsequent installation sessions.

The log file of the most recent installation is oraInventory_location:[logs]installActions.log. Previous installation log files use the following log file name format:
installActionsdate_time.log

For example:
installActions2001-02-14_09-00-56-am.log

---

**Caution:** Do not delete or manually alter the OraInventory directory or its contents. Doing so can prevent Oracle Universal Installer from locating products that install on the system.

The make.log file in the ORA_ROOT:[install] directory contains a log of every make file action that is run during the installation process. The make.log file also records any link errors during installation. Do not delete or alter the make.log file.

---

### 3.6 Noninteractive Installation and Configuration

For information about noninteractive installations, refer to Appendix B.

### 3.7 Cleaning Up After a Failed Installation

If an installation fails, then (before you attempt another installation) you may need to remove files that Oracle Universal Installer created during the last session.

To clean up after a failed installation:

1. Start Oracle Universal Installer.
2. Click **De-install Products** and select any products that were left after the failed installation.
3. Click **Remove**.

To complete the clean up, you may need to manually remove the ORA_ROOT directory.
This chapter describes how to complete postinstallation tasks after you have installed the software. It includes information about the following topics:

- Section 4.1, "DBCA"
- Section 4.2, "Required Postinstallation Tasks"
- Section 4.3, "Configuring New or Upgraded Databases"
- Section 4.4, "Changing User Passwords"
- Section 4.5, "Performing Configuration Tasks as the SYSTEM User"
- Section 4.6, "Performing Configuration Tasks as the oracle User"
- Section 4.7, "Required Product-Specific Postinstallation Tasks"
- Section 4.8, "Installing Oracle Database 10g Products from the Companion CD"

If you install and intend to use any of the products listed in Section 4.7, "Required Product-Specific Postinstallation Tasks", you must perform the tasks listed in the product-specific subsections.

---

**Note:** This chapter describes basic configuration only. Refer to *Oracle Database Administrator’s Reference* (B13738-01) and the product-specific administration and tuning guides for more sophisticated configuration and tuning information.

### 4.1 DBCA

The following sections describe the procedure for starting the Database Configuration Assistant (DBCA):

- Section 4.1.1, "Running DBCA in Interactive Mode"
- Section 4.1.2, "Using DBCA Response Files"
- Section 4.1.3, "DBCA Unsupported Options"

#### 4.1.1 Running DBCA in Interactive Mode

To start DBCA in interactive mode, perform the following:

1. Set up the X Window environment by using the following DCL command:

   ```
   SET DISPLAY/CREATE/TRANSPORT=TCP/IP/NODE=workstation_name or IP_address
   ```
2. Set default to the [BIN] directory in the Oracle home directory, and then enter the following command:

```
$ @DBCA.com
```

**Note:** Click Finish to go to the last screen. This accepts the default answers to the questions on the other screens. However, if the dbca determines that the default answers to one or more screens do not apply, the dbca will not display the last screen.

The DBCA graphical user interface (GUI) is displayed.

---

**Caution:** `orauser.com` Script Location

The `orauser.com` script must be located in the top-level Oracle home directory. Do not move this script. The definitions of Oracle logicals are created from the top-level Oracle home directory. If you run the `orauser.com` script from a location other than the Oracle home directory, Oracle Database does not work correctly.

See Also: For information about running DBCA in noninteractive or silent mode, refer to Appendix B.5, "Running DBCA in Noninteractive or Silent Mode".

---

### 4.1.2 Using DBCA Response Files

An alternative to creating an argument file to pass command-line options to DBCA is to use a response file. A sample response file (`dbca.rsp`) is provided in the `ORA_ROOT[assistants.dbca.logs]` directory. Make a copy of this file and customize it as necessary. Follow the instructions that are contained in comments. The value that is specified for the `CREATE_TYPE` field determines which of the other sections are applicable. Each field has a comment header block with the following entries: Name, Datatype, Description, Valid values, Default value, and Mandatory (Yes/No) descriptions.

For example:

```plaintext
# # Name : CREATE_TYPE
# Datatype : String
# Description : Type of database creation
# Valid values : "createDatabase" \ "createTemplateFromDB" \ "createCloneTemplate"
# Default value : None
# Mandatory : Yes
#
CREATE_TYPE = "createDatabase"
```

All mandatory values must be provided, but only for the applicable sections as indicated by the `CREATE_TYPE` value. After customizing the response file, start DBCA and pass the name of the response file at the command line as follows:

```
$ @dbca -silent -responseFile full_response_file_name
```
4.1.3 DBCA Unsupported Options

The following DBCA options are not supported with this release:

- OLAP
- UltraSearch
- Sales History Demonstration
  This demonstration requires OLAP. Oracle OLAP is not currently supported on OpenVMS.

4.2 Required Postinstallation Tasks

You must perform the tasks described in the following sections after completing an installation:

- Section 4.2.1, "Downloading and Installing Patches"
- Section 4.2.2, "Configuring Oracle Products"

4.2.1 Downloading and Installing Patches

Check the OracleMetaLink Web site for required patches for the installation. To download required patches:

1. Use a Web browser to view the OracleMetaLink Web site at http://metalink.oracle.com
2. Log on to OracleMetaLink.
3. On the main OracleMetaLink screen, click Patches.
4. Select Simple Search.
5. Specify the following information, then click Go:
   - In the Search By field, select Product or Family, then specify the RDBMS Server.
   - In the Release field, specify the current release number.
   - In the Patch Type field, specify Patchset/Minipack.
   - In the Platform or Language field, select the platform.

Note: Either OpenVMS-based arguments or UNIX-based arguments may be used in fields that are contained within a response file, but the response file argument that is passed to the dbca.com script at the command line with the responseFile keyword must be in OpenVMS-based syntax.

Note: If you are not an OracleMetaLink registered user, click Register for MetaLink! and follow the registration instructions.
4.2.2 Configuring Oracle Products

Many Oracle products and options must be configured before you use them for the first time. Before using individual Oracle Database products or options, refer to the appropriate manual in the product documentation library, available on the Oracle Documentation Library CD-ROM, DVD-ROM, or on the Oracle Technology Network Web site.

4.3 Configuring New or Upgraded Databases

Oracle recommends that you run the utlrp.sql script after creating or upgrading a database. This script recompiles all PL/SQL modules that may be in an invalid state, including packages, procedures, and types. This is an optional step but Oracle recommends that you do it during installation and not at a later time.

To run the utlrp.sql script:

1. Log in as the oracle user.
2. Set the default to the Oracle home directory and run the following command:
   
   $ orauser sid

   where sid is the database instance ID of the target database.
3. Start SQL*Plus as follows:

   $ sqlplus "/ AS SYSDBA"

4. If necessary, start the database:

   SQL> STARTUP

5. Run the utlrp.sql script as follows:

   SQL> @ora_root:[rdbms.admin]utlrp.sql

4.4 Changing User Passwords

Oracle recommends that you change the password for user names immediately after installation. To change a password:

1. Start SQL*Plus by using the following command:

   $ sqlplus

2. Connect with the user name and password that you want to change by using the following command:

   Enter user-name: username/password

3. Change the password by using the following command:

   SQL> ALTER USER USERNAME IDENTIFIED BY PASSWORD;

4.5 Performing Configuration Tasks as the SYSTEM User

You must log in as the Oracle Admin account user and perform the following configuration task.
Automating Database Startup and Shutdown (Optional)
You can configure the system to automatically start Oracle Database when the system starts up and to shut down Oracle Database when the system shuts down. Automating database startup is optional, but automatic shutdown is recommended because it guards against improper shutdown of the database.

4.6 Performing Configuration Tasks as the oracle User
You must log in as the oracle user to set initialization parameters.

Setting Initialization Parameters
When you create a database, the init$SID.ora parameters are automatically set. You can manually modify the initialization parameters in the init$SID.ora with an OpenVMS editor. Activate the modified init$SID.ora file by shutting down and restarting the database.

Do not use logics in parameter files unless they are defined at an appropriate high level (in other words, at a group level or the system level).

See Also: Oracle Database Administrator's Reference (B13738-01) for information about init.ora parameters

4.7 Required Product-Specific Postinstallation Tasks
The following sections describe postinstallation tasks that you must perform if you install and intend to use the following products:

- Section 4.7.1, "Configuring Oracle Net Services Services"
- Section 4.7.2, "Configuring Oracle Label Security"
- Section 4.7.3, "Installing Oracle Text Supplied Knowledge Bases"
- Section 4.7.4, "Configuring Oracle Messaging Gateway"
- Section 4.7.5, "Oracle Precompilers"

Note: You must perform postinstallation tasks only for the products that you intend to use.

4.7.1 Configuring Oracle Net Services Services
If you have a previous release of Oracle software installed on this system, you may want to copy information from the Oracle Net Services tnsnames.ora and listener.ora configuration files from the previous release to the corresponding files for the new release.

Note: The default location for the tnsnames.ora and listener.ora files is the ora_root:[network.admin] directory.

Modifying the listener.ora File
If you are upgrading from a previous release of Oracle Database, Oracle recommends that you use the current release of Oracle Net Services listener instead of the listener from the previous release.
To use the listener from the current release, you may need to copy static service information from the `listener.ora` file from the previous release to the version of that file used by the new release.

**Modifying the `tnsnames.ora` File**

Unless you use a central `tnsnames.ora` file, copy Oracle Net Services service names and connect descriptors from the previous release `tnsnames.ora` file to the version of that file used by the new release.

If necessary, you can also add connection information for additional database instances to the new file.

### 4.7.2 Configuring Oracle Label Security

If you install Oracle Label Security, you must configure it in a database before you use it. You can configure Oracle Label Security in two ways, with or without Oracle Internet Directory integration. If you configure Oracle Label Security without Oracle Internet Directory integration, you cannot configure it to use Oracle Internet Directory at a later stage.

**Note:** To configure Oracle Label Security with Oracle Internet Directory integration, Oracle Internet Directory must be installed in the environment and Oracle Database must be registered in the directory.

**See Also:** For more information about Oracle Label Security enabled with Oracle Internet Directory, refer to the *Oracle Label Security Administrator’s Guide* (B10774-01).

### 4.7.3 Installing Oracle Text Supplied Knowledge Bases

An Oracle Text knowledge base is a hierarchical tree of concepts used for theme indexing, ABOUT queries, and deriving themes for document services. If you plan to use any of these Oracle Text features, you can install two supplied knowledge bases (English and French) from the Oracle Database 10g Companion CD.

**Note:** You can extend the supplied knowledge bases depending on your requirements. Alternatively, you can create knowledge bases, possibly in languages other than English and French. For more information about creating and extending knowledge bases, refer to the *Oracle Text Reference* (B10730-02).

For information about how to install products from the Companion CD, refer to Section 4.8, "Installing Oracle Database 10g Products from the Companion CD".

### 4.7.4 Configuring Oracle Messaging Gateway

To configure Oracle Messaging Gateway, refer to the section about Messaging Gateway in *Oracle Streams Advanced Queuing User’s Guide and Reference* (B10785-01). When following the instructions listed in that manual, refer to this section for additional instructions about configuring the `listener.ora`, `tnsnames.ora`, and `mgw.ora` files.
Modifying the listener.ora File for External Procedures
To modify the ORACLE_HOME:[network.admin]listener.ora file for external procedures:

1. Back up the listener.ora file.
2. Ensure that the default IPC protocol address for external procedures is set as follows:

   \(\text{ADDRESS} = (\text{PROTOCOL=IPC})(\text{KEY=EXTPROC})\)

3. Add static service information for a service called mgwextproc by adding the following lines to the SID_LIST parameter for the listener in the listener.ora file:

   \[
   \text{(SID_DESC =}
   \begin{align*}
   & (\text{SID_NAME = mgwextproc}) \\
   & (\text{ORACLE_HOME = oracle_home}) \\
   & (\text{PROGRAM = extproc})
   \end{align*}
   \]

   For example, set the SID_LIST parameter as follows:

   \[
   \text{SID_LIST_LISTENER =}
   \begin{align*}
   & (\text{SID_LIST =}
   \begin{align*}
   & (\text{SID_DESC =}
   \begin{align*}
   & (\text{SID_NAME = PLSExtProc}) \\
   & (\text{ORACLE_HOME = somedisk:oracle.product.10_1_0.db_1}) \\
   & (\text{PROGRAM = extproc})
   \end{align*}
   \end{align*}
   \end{align*}
   \]
   \]

   In this example:
   - oracle_home is the path of the Oracle home directory.
   - extproc is the external procedure agent executable file.

Modifying the tnsnames.ora File for External Procedures
To modify the ORACLE_HOME:[network.admin]tnsnames.ora file for external procedures:

1. Back up the tnsnames.ora file.
2. In the tnsnames.ora file, add a connect descriptor with the net service name MGW_AGENT as follows:

   \[
   \text{MGW_AGENT =}
   \begin{align*}
   & (\text{DESCRIPTION =}
   \begin{align*}
   & (\text{ADDRESS_LIST = (ADDRESS = (PROTOCOL=IPC)(KEY=EXTPROC)))} \\
   & (\text{CONNECT_DATA = (SID=mgwextproc) (PRESENTATION=RO))})
   \end{align*}
   \]
   \]

   In this example:
   - The value specified for the KEY parameter must match the value specified for that parameter in the IPC protocol address in the listener.ora file.
Required Product-Specific Postinstallation Tasks

- The value of the SID parameter must match the service name in the listener.ora file that you specified for the Oracle Messaging Gateway external procedure agent in the previous section (mgwextproc).

Setting Up the mgw.ora Initialization File

To modify the ORA_ROOT:[mgw.admin]mgw.ora file for external procedures, set the CLASSPATH logical. A sample mgw.ora file can be found in the ORA_ROOT:[mgw.admin]sample_mgw.ora directory.

You must include the classes in Table 4–1 and any additional classes required for Oracle Messaging Gateway to access non-Oracle messaging systems, such as WebSphere MQ or TIBCO Rendezvous classes.

<table>
<thead>
<tr>
<th>Classes</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Messaging Gateway</td>
<td>ORA_ROOT:[mgw.classes]mgw.jar</td>
</tr>
<tr>
<td>JRE run time</td>
<td>ORA_ROOT:[JRE.lib]rt.jar</td>
</tr>
<tr>
<td>Oracle JDBC</td>
<td>ORA_ROOT:[jdbc.lib]ojdbc14.jar</td>
</tr>
<tr>
<td>Oracle internationalization</td>
<td>ORA_ROOT:[jdbc.lib]orai8n.jar</td>
</tr>
<tr>
<td>JMS Interface</td>
<td>ORA_ROOT:[rdbms.jlib]jmscommon.jar</td>
</tr>
<tr>
<td>Oracle JMS implementation</td>
<td>ORA_ROOT:[rdbms.jlib]aqapil3.jar</td>
</tr>
<tr>
<td>Java Transaction API</td>
<td>ORA_ROOT:[jlib]jta.jar</td>
</tr>
</tbody>
</table>

4.7.5 Oracle Precompilers

The following sections describe references and configuration files that are associated with Oracle precompilers.

Pro*C/C++

For the Pro*C/C++ precompiler, the configuration file is pcscfg.cfg. This file installs without content. Use any text editor to customize it to the site requirements. For more information about configuring the pcscfg.cfg file, refer to Pro*C/C++ Programmer’s Guide.

Pro*COBOL

For the Pro*COBOL precompiler, the configuration file is pcbcfg.cfg. This file installs without content. Use any text editor to customize it to the site requirements. For more information about configuring the pcbcfg.cfg file, refer to Pro*COBOL Programmer’s Guide.

Pro*FORTRAN

For the Pro*FORTRAN precompiler, the configuration file is pccfor.cfg. This file installs without content. Use any text editor to customize it to the site requirements. For more information about configuring the pccfor.cfg file, refer to Pro*FORTRAN Supplement to the Oracle Precompilers Guide.
4.8 Installing Oracle Database 10g Products from the Companion CD

The Oracle Database 10g Companion CD contains additional products that you can install. Whether you must install these products or not depends on which Oracle Database products or features that you plan to use. If you plan to use the following products or features, Oracle recommends that you install the products from the Companion CD:

- Oracle JVM
- Oracle interMedia
- Oracle Text

To install Oracle Database products from the Companion CD:

1. Insert the Oracle Database 10g Companion CD into the disk drive.
2. Login to the Oracle OpenVMS account.
3. Mount the CD with the following command:
   
   $ MOUNT/OVERR=ID cd_device

4. Start a new terminal session.
5. Set up display using the `set display` command.
6. Set up logical `ORACLE_HOME` in OpenVMS syntax.
7. Set up the `TMP` directory and define `TMP` logical in UNIX-style syntax.
8. Set up the inventory directory, and create the `oraInst.loc` file.
9. Define the logical `ORA_BATCH_QUEUE_nodename` to point to an existing batch queue (For more information about batch queue, refer to Appendix E).
10. Create a file, `cluster_nodes.dat`, in the `sys$login` directory with the list of nodes that are to comprise the RAC cluster. This file displays each node on a separate line with the primary node listed first.
11. Run the `$ set noverify` command.
12. Run the following command:
   
   $ set process/priv=all

13. Start the `runInstaller` script as follows:
   
   $ @ora_root:[oui.bin]runinstaller.com

When installing products from the Companion CD, ensure that the inventory you specify is the same as the inventory specified for the 10g Database installation. This is because the Companion CD can only be installed on top of an existing 10g Database Installation.
5
Installing RAC

This chapter provides an overview of the procedure for installing Oracle Database 10g Real Application Clusters (RAC).

You may also need to refer to the following Oracle documents for detailed information about installing and administrating RAC on an OpenVMS system:

- Oracle Real Application Clusters Installation and Configuration Guide (B10766-08)
- Oracle Real Application Clusters Administration and Deployment Guide (B14197-01)
- Oracle Real Application Clusters Deployment and Performance Guide (B10768-02)

RAC configuration is described in Chapter 6, "Configuring RAC".

This chapter contains the following topics:

- Section 5.1, "RAC Documentation Overview"
- Section 5.2, "List of OpenVMS Patches for Oracle Database 10g Release 1 (10.1)"
- Section 5.3, "Quota Considerations for Oracle Real Application Clusters"
- Section 5.4, "Cluster Setup and Preinstallation Configuration Tasks"
- Section 5.5, "Preinstallation, Installation, and Postinstallation Overview"
- Section 5.6, "Oracle Universal Installer and Real Application Clusters"
- Section 5.7, "Additional Considerations"
- Section 5.8, "Oracle Database 10g and RAC Components"
- Section 5.9, "RAC Version Compatibility"
- Section 5.10, "Installing Cluster Ready Services on OpenVMS"
- Section 5.11, "Installation Tasks for RAC on OpenVMS"
- Section 5.12, "Selecting a Database Configuration Type"
- Section 5.13, "RAC Installation Setup Procedures"
- Section 5.14, "Installation of Oracle Database 10g with RAC"
- Section 5.15, "Postinstallation Procedures for RAC"
- Section 5.16, "Uninstalling RAC Software"

5.1 RAC Documentation Overview

This section describes the RAC documentation set. The platform-specific Oracle Database 10g CD contains a copy of Oracle Database Installation Guide (B13681-01) in
both HTML and PDF format. This chapter contains the preinstallation, installation, and postinstallation information for RAC. Additional information for this release may be available in the Oracle Database 10g README file or Release Notes.

The Server Documentation CD contains the following additional documentation about RAC administration and deployment:

- Section 5.1.1, "Oracle RAC Administrator’s Guide"
- Section 5.1.2, "Oracle RAC Deployment and Performance Guide"
- Section 5.1.3, "Documentation Sources"

### 5.1.1 Oracle RAC Administrator’s Guide

*Oracle Real Application Clusters Administrator's Guide* (B10765-01) provides RAC-specific administration information. Some of the topics described in this book include the use of Oracle Enterprise Manager in RAC environments. This book describes how to administer services and storage and how to use RAC scalability features to add and delete instances and nodes in RAC environments. This book also discusses how to use Recovery Manager (RMAN) and how to perform backup and recovery in RAC.

In addition, *Oracle Real Application Clusters Administrator’s Guide* describes how to use the Server Control (SRVCTL) utility to start and stop the database and instances, manage configuration information, and to delete or move instances and services. The appendix describes how you can resolve various RAC tools messages. A troubleshooting section describes how to interpret the content of RAC-specific log files.

### 5.1.2 Oracle RAC Deployment and Performance Guide

The *Oracle Real Application Clusters Deployment and Performance Guide* (B10768-02) highlights the main deployment topics for RAC by briefly describing Cluster Ready Services (CRS), storage, database creation, and services deployment in RAC. Design and deployment topics in this reference book describe service topologies and workload management in RAC. Specifically, the book describes how the Automatic Workload Repository tracks and reports service levels and how you can use service level thresholds and alerts to ensure high-availability in a RAC environment. A services deployment example is also available in the appendix of the book, and you can use it to learn more about how to deploy and to manage services in RAC environments.

The *Oracle Real Application Clusters Deployment and Performance Guide* provides a high-level description of interconnect protocols, as well as information about how to monitor and tune performance in RAC environments using both Oracle Enterprise Manager and using information in the Automated Workload Repository and Oracle performance views. The book highlights some application-specific deployment techniques for online transaction processing (OLTP) and data warehousing environments.

### 5.1.3 Documentation Sources

The information in this chapter is meant to supplement the detailed information you can find in *Oracle Real Application Clusters Administrator’s Guide* (B10765-01). Refer to that document as necessary when reading through this chapter.

In addition, you will find important OpenVMS-specific installation and configuration information pertaining to Oracle Real Application Clusters in Chapter 5, "Installing RAC" and Chapter 6, "Configuring RAC".
Cluster Setup and Preinstallation Configuration Tasks

For more general information about configuring and using Oracle Real Application Clusters, refer to the Oracle Real Application Clusters Installation and Configuration Guide (B10766-08).

5.2 List of OpenVMS Patches for Oracle Database 10g Release 1 (10.1)

Note that you need some mandatory OpenVMS patches if you intend to run Oracle Real Application Clusters.

For OpenVMS 7.3.2, you need the following patches:

- DEC AXPVMS VMS732_PTHREAD V1.0
- DEC AXPVMS VMS732_SYS V5.0
- TCP/IP 5.4 ECO 1

These ECOs can be downloaded from the Hewlett-Packard Services Web site at http://h71000.www7.hp.com/serv_support.html

Note that these patches are minimum versions and are likely to be superseded by later versions. Install the latest available versions.

5.3 Quota Considerations for Oracle Real Application Clusters

Oracle Real Application Clusters is a completely redesigned feature from the Parallel Server Option in versions prior to Oracle Database 10g. Oracle Database includes a portable Distributed Lock Manager (DLM) internal to the database server.

Because of this, the usage of the ENQLM quota by the Oracle Real Application Clusters Option has been greatly reduced. Large ENQLM boosts for background processes are no longer necessary in the Oracle Database environment.

The Process Quota estimation functions of the Oracle Database attempt to make reasonable calculations for the various backgrounds started during server operations. You can change the quota that is allocated to a background process by defining certain system logical names before the instance is started.

To effect the process quota given to all backgrounds in an instance, define the following:

```bash
$ define/system ORA_sid_PQL$_quota quota_value
```

If you have a SID named TOM1, and if you want to boost the BYTLM quota to 2 MB, then use the following:

```bash
$ define/system ORA_TOM1_PQL$_BYTLM 2000000
```

Alternatively, you could effect the process quota of a particular background by defining the following:

```bash
$ define/system ORA_sid_process_PQL$_quota quota_value
```

If you want the LMD0 process of the TOM1 SID to get 3 MB of BYTLM, then you would use the following:

```bash
$ define/system ORA_TOM1_LMD0_PQL$_BYTLM 3000000
```

5.4 Cluster Setup and Preinstallation Configuration Tasks

Before installing RAC, perform the following steps:
1. Ensure that you have a certified combination of operating system and Oracle software version by referring to the OracleMetaLink certification information at http://metalink.oracle.com. On this Web site, click Certify and Availability, and then select 1. View Certifications by Product.

2. Configure a high-speed interconnect that uses a private network. Configure a second interconnect for redundancy to avoid making the interconnect a potential single point of failure. Some platforms support automatic failover to the alternate interconnect. To enable this, you must configure the operating system-provided failover mechanism.

3. Install the operating system patches that are listed in the preinstallation sections later in this chapter.

5.5 Preinstallation, Installation, and Postinstallation Overview

The following sections describe the installation procedures that are covered in detail in this chapter:

- Section 5.5.1, "Preinstallation Overview"
- Section 5.5.2, "Installation Overview"
- Section 5.5.3, "Postinstallation Overview"

5.5.1 Preinstallation Overview

The preinstallation procedures explain how to verify user equivalence, perform network connectivity tests, as well as how to set directory and file permissions. Complete all of the preinstallation procedures and verify that the system meets all of the preinstallation requirements before proceeding to the install phase.

5.5.2 Installation Overview

Oracle Database 10g Real Application Clusters installation is a two-phase installation. In phase one, use Oracle Universal Installer to install CRS as described in Section 5.8.1, "CRS Clusterware". Note that the Oracle home that you use in phase one is a home for the CRS software. This Oracle home must be different from the Oracle home that you use in phase two for the installation of Oracle Database software with RAC components. The CRS preinstallation starts the CRS processes in preparation for installing Oracle Database with RAC as described in Section 5.14, "Installation of Oracle Database 10g with RAC".

After the installation is complete, Oracle Universal Installer starts the Oracle assistants, such as the Database Configuration Assistant (DBCA), to configure the environment and create the RAC database. You can later use the DBCA Instance Management feature to add or modify services and instances as described in Section 6.6, "Creating a RAC Database By Using DBCA".

5.5.3 Postinstallation Overview

After you create the database, download and install the most recent patch sets for Oracle Database 10g as described in Section 5.15.2, "Downloading and Installing Patches". If you are using other Oracle products with the RAC database, then you must also configure them.
You must perform several postinstallation configuration tasks to use certain Oracle Database 10g products such as the Sample Schema, Oracle Net Services, or Oracle Messaging Gateway. You must also configure Oracle precompilers, and if required, configure Oracle Advanced Security.

Use the Companion CD to install additional Oracle Database 10g software that may improve performance or extend database capabilities, such as Oracle JVM, Oracle interMedia or Oracle Text.

**See Also:**  *Oracle Real Application Clusters Administration and Deployment Guide* (B14197-01) for more information about using RAC scalability features of adding and deleting nodes and instances from RAC databases.

### 5.6 Oracle Universal Installer and Real Application Clusters

Oracle Universal Installer facilitates the installation of Cluster Ready Services (CRS) and Oracle Database 10g software. In most cases, you must use the graphical user interface (GUI) provided by Oracle Universal Installer to install the software. However, you can also use Oracle Universal Installer to complete scripted installations without using the GUI. Refer to Appendix B for information about scripted installations.

When Oracle Universal Installer installs the Oracle software, Oracle recommends that you select a preconfigured database or use DBCA interactively to create the cluster database. You can also manually create the database as described in procedures posted at [http://www.oracle.com/technology](http://www.oracle.com/technology)

When you create the RAC database using Oracle Universal Installer or DBCA, or if you use the Enterprise Manager Configuration Assistant to configure Enterprise Manager, then Enterprise Manager is configured for the cluster database. You can also manually create the database as described in procedures posted at [http://www.oracle.com/technology](http://www.oracle.com/technology)

When you create the RAC database using Oracle Universal Installer or DBCA, or if you use the Enterprise Manager Configuration Assistant to configure Enterprise Manager, then Enterprise Manager is configured for the cluster database. You can also manually create the database as described in procedures posted at [http://www.oracle.com/technology](http://www.oracle.com/technology)

You can configure Enterprise Manager Grid Control to manage multiple databases and application servers from a single console. To manage RAC databases in Grid Control, you must install a Grid Control agent on each of the nodes of the cluster. The Agent installation is clusterized, which means you need to perform the install on only one of the cluster nodes.

**See Also:**
- *Oracle Universal Installer Concepts Guide* (B12140-01) for details about Oracle Universal Installer
- *Oracle Real Application Clusters Administration and Deployment Guide* (B14197-01) for information about using Enterprise Manager to administer RAC environments

### 5.7 Additional Considerations

Following are some additional considerations for using Oracle Database 10g features in Oracle Real Application Clusters (RAC). Oracle recommends using the following Oracle Database 10g features to simplify RAC database management:

- **Enterprise Manager**

  Use Enterprise Manager to administer the entire processing environment, not just the RAC database. Enterprise Manager enables you to manage a RAC database with its instance targets, listener targets, host targets, and a cluster target.
Oracle Database 10g and RAC Components

- Automatic undo management
  This feature automatically manages undo processing.
- Automatic segment space management
  This feature automatically manages segment freelists and freelist groups.
- Locally managed tablespaces
  These enhance space management performance.

See Also: Oracle Real Application Clusters Administration and Deployment Guide (B14197-01) for more information about features available in RAC environments

5.8 Oracle Database 10g and RAC Components

Oracle Database 10g provides single-instance database software and additional components to operate RAC databases. Some of the RAC-specific components include:

- Section 5.8.1, "CRS Clusterware"
- Section 5.8.2, "Installed RAC Components"

5.8.1 CRS Clusterware

Cluster Ready Services (CRS) must be installed only on one node. However, you must configure and start the CRS on each node where you intend to install or run the RAC-enabled database. The home that you select for CRS must be different from the RAC-enabled Oracle home.

5.8.2 Installed RAC Components

All instances in RAC environments share the control file, server parameter file, redo log files, and all data files. These are accessed by all the cluster database instances. Each instance also has its own set of redo log files. During failures, shared access to redo log files enables surviving instances to perform recovery.

5.9 RAC Version Compatibility

You can install and operate multiple Oracle homes and different versions of Oracle cluster database software on the same computer as described in the following points:

- You can install multiple Oracle Database 10g RAC homes on the same node. The multiple homes feature enables you to install one or more releases on the same computer in multiple Oracle home directories. However, each node can have only one CRS home.
- If you run Oracle Universal Installer to install RAC on a system that already has an Oracle Database 10g RAC installation in the same home, then Oracle Universal Installer prompts you to install additional Oracle Database 10g products if you have not already installed all of them.
- You can use Oracle Universal Installer to complete some of the steps involved in removing and reinstalling RAC if required.

Note: Do not move Oracle binaries from one Oracle home to another because this causes dynamic link failures.
5.10 Installing Cluster Ready Services on OpenVMS

The following sections describe the procedure for installing CRS. This is the first phase of installing Oracle Database 10g with Oracle Real Application Clusters (RAC). These sections also explain how to create RAC databases, and describe the postinstallation tasks.

- Section 5.10.1, "Installation Setup"
- Section 5.10.2, "Installing Cluster Ready Services"

5.10.1 Installation Setup

In addition to the public IP address of the host computer, obtain two more IP addresses for each node that is going to be part of the installation. During the installation, enter the IP addresses into the DNS. One of the IP addresses must be a public IP address for the virtual IP address of the node. Virtual IP addresses are used for client-to-database connections. Therefore, the virtual IP address must be publicly accessible. The other address must be a private IP address for internode, or instance-to-instance Cache Fusion traffic. Using public interfaces for Cache Fusion can cause performance problems.

5.10.2 Installing Cluster Ready Services

This section describes the procedure for using Oracle Universal Installer to install CRS. Note that the CRS home that you identify in this phase of the installation is only for CRS software. This home cannot be the same home as the home that you use in phase two to install Oracle Database software with Oracle Real Application Clusters (RAC).

1. Start a new terminal session.
2. Set up display using the set display command.
3. Set up logical \texttt{ORACLE\_HOME} in OpenVMS syntax.
4. Set up the TMP directory and define TMP logical in UNIX-style syntax.
5. Set up the inventory directory, and create the \texttt{oraInst.loc} file.
6. Define logical \texttt{ORA\_BATCH\_QUEUE\_nodename} to point to an existing batch queue (For more information about batch queue, refer to Appendix E).
7. Create a file, \texttt{cluster\_nodes.dat}, in the \texttt{sys$login} directory with the list of nodes that are to comprise the RAC cluster. This file displays each node on a separate line with the primary node listed first.
8. Enter the $ set noverify command.
9. Enter the $ set process/priv=all command.
10. Start the \texttt{runInstaller} script located in the [.Disk1] directory.
11. Depending on whether the environment has an Oracle inventory, the following scenarios apply:
   - If you are performing this installation in an environment where Oracle Universal Installer inventory is already set up, then Oracle Universal Installer displays the Specify File Locations screen. If the Specify File Locations screen is displayed, then proceed to Step 12.
   - If you are performing this installation in an environment in which you have never installed Oracle Database software (in other words, the environment does not have an Oracle product inventory), then Oracle Universal Installer...
displays the Specify Inventory Directory and Credentials screen. Enter the inventory location in the Specify Inventory Directory and Credentials screen, click Next, and then Oracle Universal Installer displays the next screen.

12. The Specify File Locations screen contains predetermined information for the source of the installation files and the target destination information. Enter the CRS home name and its location in the target destination, click Next, and Oracle Universal Installer displays the Language Selection screen.

Note: The CRS home that you identify in this step must be different from the Oracle home that you will use in phase two of the installation.

13. In the Language Selection screen, select the languages that you want CRS to use, click Next, and Oracle Universal Installer displays the Cluster Configuration screen.

14. The Cluster Configuration screen contains predefined node information if Oracle Universal Installer retrieved the nodes specified in cluster_nodes.dat. Otherwise, Oracle Universal Installer displays the Cluster Configuration screen without predefined node information.

Enter a public node name and a private node name for each node. When you enter the public node name, use the primary host name of each node. In other words, use the name displayed by the hostname command. This node name can be either the permanent or the virtual host name.

In addition, the cluster name that you use must be globally unique throughout the enterprise and the allowable character set for the cluster name is the same as that for host names, that is, underscores (_), hyphens (-), and single-byte alphanumeric characters (a to z, A to Z, and 0 to 9). Oracle recommends that you use the vendor cluster name if one exists. Ensure that you also enter a private node name or private IP address for each node. This is an address that is only accessible by the other nodes in this cluster. Oracle uses the private IP addresses for Cache Fusion processing. Click Next after you have entered the cluster configuration information, and Oracle Universal Installer performs validation checks such as node availability and remote Oracle home permissions verifications. These verifications may require some time to complete. When Oracle Universal Installer completes the verifications, it displays the Specify Network Interface Usage screen.

Note: The IP addresses that you use for all of the nodes in the current installation process must be from the same subnet.

15. On the Specify Network Interface Usage screen Oracle Universal Installer displays a list of clusterwide interfaces. Use the lists on this screen to classify each interface as Public, Private, or Do Not Use. The default setting for each interface is Do Not Use. You must classify at least one interconnect as Public and one as Private.

16. When you click Next on the Specify Network Interface Usage screen, Oracle Universal Installer will look for the ocr.loc file. Oracle Universal Installer will look for the file in the disk:[mylogin.vmshost] directory. If the ocr.loc file exists, and if the ocr.loc file has a valid entry for the Oracle Cluster
Installing Cluster Ready Services on OpenVMS

Registry (OCR) location, then the Voting Disk Location screen is displayed and you should proceed to Step 17.

Otherwise, the Oracle Cluster Registry Location Information screen is displayed. Enter a complete path for the shared file system file for the Oracle Cluster Registry, click Next, and the Voting Disk Information screen is displayed.

17. On the Voting Disk Information screen, enter a complete path and file name for the file in which you want to store the voting disk, and then click Next.

Note: The storage size for the OCR should be at least 100 MB and the storage size for the voting disk should be at least 20 MB. In addition, Oracle recommends that you use a RAID array for storing the OCR and the voting disk to ensure the continuous availability of the partitions.

18. Oracle Universal Installer displays the list of components that will be installed on the Summary screen. Review the list of components and click Install.

19. Oracle Universal Installer runs the Oracle Private Interconnect Configuration Assistant. This assistant runs without your intervention.

Note: If one or more of the configuration assistants fails, then you can manually rerun the script created by Oracle Universal Installer to determine the cause of the failure. You can find this script in the CRS home:cfgtoollogs directory. You may need to edit the script to replace placeholders for passwords, to remove steps that completed successfully, and so on.

20. When Oracle Universal Installer displays the End of Installation screen, click Exit to exit Oracle Universal Installer.


22. Verify the CRS installation by running the following olsnodes command:

   
   olsnodes
   

   The output from this command should be a listing of the nodes on which CRS was installed as shown in the following example:

   
   $ olsnodes -n
   racserver1 1
   racserver1 2

   At this point, you have completed phase one, the installation of Cluster Ready Services, and are ready to install Oracle Database 10g with RAC as described in Section 5.11, "Installation Tasks for RAC on OpenVMS".

Cluster Ready Services Background Processes

The following processes must be running in the environment after the CRS installation for Cluster Ready Services to function:

- evmd

   Event manager daemon that starts the racgevt process to manage callouts.

- ocssd
Manages cluster node membership and runs as the oracle user. Failure of this process results in cluster restart.

- **crsd**

  Performs high-availability recovery and management operations such as maintaining the OCR. Also manages application resources and runs as the root user and restarts automatically upon failure.

## 5.11 Installation Tasks for RAC on OpenVMS

The following sections describe phase two of the installation procedures for installing Oracle Database 10g with Oracle Real Application Clusters (RAC). They also describe some of Oracle Universal Installer features.

## 5.12 Selecting a Database Configuration Type

This section describes Oracle Universal Installer features that you should understand before beginning phase two of the RAC installation process. When you run Oracle Universal Installer and select Oracle Database 10g, you can select the General Purpose, Transaction Processing, Data Warehouse, or Advanced configuration type.

For the first three configuration types, you can complete additional procedures that are described later in this chapter. If you select the fourth type, or the Advanced configuration, then you can use DBCA to create the database as described in Section 6.2, "Using DBCA for RAC". Oracle recommends that you use DBCA to create the database.

You can also select the Advanced configuration, select a preconfigured template, customize the template, and use DBCA to create a database using the template. These templates correspond to the General Purpose, Transaction Processing, and Data Warehouse configuration types. You can also use DBCA with the Advanced template to create a database.

Oracle recommends that you use one of the preconfigured database options or use the Advanced option and DBCA to create the database. However, if you want to configure the environment and create the database manually, then select the **Do not create a starter database** configuration option and refer to the manual database creation procedures posted at

http://www.oracle.com/technology

This section discusses the following topics:

- Section 5.12.1, "Configuration Type Descriptions"
- Section 5.12.2, "Action of Oracle Universal Installer, DBCA, and Other Assistants During Installation"

### 5.12.1 Configuration Type Descriptions

The configuration type that you select, as described in Table 5–1, determines how you proceed.
5.12.1.1 Using the Standard Configuration Types

If you select one of the first three configuration types on Select Database Configuration screen of Oracle Universal Installer, then complete the procedure described in "RAC Installation Setup Procedures". These three configuration types use preconfigured templates. After you complete these procedures, the Oracle Network Configuration Assistant (NETCA) and DBCA run without further input and Oracle Universal Installer displays a progress indicator during the installation. DBCA processing for these configuration types creates a starter database and configures the network services.

5.12.1.2 Using the Advanced Configuration Type

When you select the Advanced configuration type, Oracle Universal Installer runs DBCA which displays the following four preconfigured database template choices:

- General Purpose
- Transaction Processing
- Data Warehouse
- Advanced

The first three templates create a database that is optimized for that environment. You can also customize these templates. The Advanced type, however, creates a database without using preconfigured options.

The following section provides more detail about Oracle Universal Installer and DBCA processing when creating a RAC database.

5.12.2 Action of Oracle Universal Installer, DBCA, and Other Assistants During Installation

After installation, Oracle Universal Installer starts the NETCA. After the NETCA completes its processing, Oracle Universal Installer runs DBCA to create the database. This means that DBCA creates the database files, including the default server parameter file (spfile), using standard file naming and file placement practices. The primary phases of DBCA processing are:

- Verifying that you correctly configure the shared disks for each tablespace if you use raw storage
- Creating the database
- Configuring Oracle network services

Table 5–1  Oracle Universal Installer Database Configuration Types

<table>
<thead>
<tr>
<th>Configuration Type</th>
<th>Description</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose, Transaction Processing, and Data Warehouse</td>
<td>Installs a preconfigured starter database, licensable Oracle options (including Oracle Database 10g with RAC), networking services, Oracle Database 10g utilities, and online documentation. At the end of the installation, DBCA creates and configures the RAC database.</td>
<td>Minimal input required. You can create the database more quickly than with the Advanced type.</td>
</tr>
<tr>
<td>Advanced</td>
<td>Enables you to customize the database options and storage components.</td>
<td>Enables you to create arbitrary tablespaces and data files and customize all aspects of the database.</td>
</tr>
<tr>
<td>Do not create a starter database</td>
<td>Installs only the software. Does not configure the listeners, network infrastructure, and does not create a database.</td>
<td></td>
</tr>
</tbody>
</table>

Table 5–1: Oracle Universal Installer Database Configuration Types

Installing RAC  5-11
Starting the listeners and database instances

You can also use DBCA in standalone mode to create a database.

See Also: The Oracle Database Net Services Administrator’s Guide for more information about troubleshooting and LDAP support

The remainder of this chapter explains how to use Oracle Universal Installer to install Oracle Database 10g with RAC.

5.13 RAC Installation Setup Procedures

If the user who installed Cluster Ready Services (CRS) is the same as the user who installs RAC, then all of the user-level preinstallation steps must be completed.

1. Perform a network connectivity test to ensure that all nodes on which you want to perform this installation can communicate with each other. Ensure that the public and private network interfaces have the same interface names on each node of the cluster.

2. Set directory and file creation permissions so that you can write as oracle user to all the Oracle homes in the RAC database environment in which you are performing this installation.

3. Create directories for the Oracle home and Oracle data files.

Note: The Oracle home that you create for installing Oracle Database 10g with the RAC software cannot be the same Oracle home that you used during the CRS installation.

You can use the Oracle9i Database language and territory definition files with Oracle Database 10g release 1 (10.1) that you are about to install. To enable this functionality, you must run Oracle Universal Installer from a command line, described in Step 1 in Section 5.14, "Installation of Oracle Database 10g with RAC", and use following statement to set the b_cr9idata variable to true:

$ runInstaller oracle.rsf.nlsrtl_rsf:b_cr9idata=true

5.14 Installation of Oracle Database 10g with RAC

Perform the following procedure to install Oracle Database 10g release 1 software with RAC:

1. Start the runInstaller command from the top-level directory of the Oracle Database 10g release 1 CD-ROM.

   If you are installing the software from a hard drive, then navigate to the parent directory of the directory where Oracle Database 10g product is stored and run the setup.exe program.

2. When Oracle Universal Installer displays the Welcome screen, click Next, and Oracle Universal Installer displays the Specify File Locations screen.

3. The Source field on the Specify File Locations screen is pre-populated with the path to the file products.xml. Enter the Oracle home name and location in the target destination and click Next.
If you enter a preexisting Oracle home and the Oracle home is not registered with Oracle Universal Installer inventory, then Oracle Universal Installer displays a warning that the Oracle home that you selected is nonempty. Click OK on this Oracle Universal Installer warning dialog box to continue installing in that directory. If the Oracle home exists and is registered with Oracle Universal Installer inventory, and if the Oracle home was created with a cluster install, then Oracle Universal Installer displays the Selected Nodes screen.

If you enter an Oracle home that does not exist, then Oracle Universal Installer displays the Specify Hardware Cluster Installation Mode screen.

4. The Selected Nodes screen is an informational screen that displays the selected nodes that are associated with a cluster home. Click Next on this screen and Oracle Universal Installer displays the Select Installation Type screen.

When you click Next on the Selected Nodes screen, Oracle Universal Installer verifies that the Oracle home directory is writable on the remote nodes and that the remote nodes are operating. Oracle Universal Installer also revalidates user equivalence.

If Oracle Universal Installer detects a network or user equivalence problem on any node that you have included in this installation, then the Installer displays a warning on the Selected Nodes screen. This warning is displayed next to the node and indicates that you should correct a problem on the affected node before proceeding. To resolve problems, examine Oracle Universal Installer actions recorded in the following file:

oraInventory\logs\installActions\date_time.log

5. On the Specify Hardware Cluster Installation Mode screen, select an installation mode. The Cluster Installation mode is selected by default when Oracle Universal Installer detects that you are performing this installation on a cluster. In addition, the local node is always selected for the installation. Select additional nodes that are to be part of this installation session and click Next.

See Also: If you select Local Installation, then refer to Oracle Database Installation Guide (B13681-01) to perform a single-node, non-RAC installation.

When you click Next on the Specify Hardware Cluster Installation screen, Oracle Universal Installer verifies that the Oracle home directory is writable on the remote nodes and that the remote nodes are operational. Oracle Universal Installer also revalidates user equivalence.
If Oracle Universal Installer detects a network or user equivalence problem on any node that you have included in this installation, then Oracle Universal Installer displays a warning on the Specify Hardware Cluster Installation Selection screen. This warning is displayed next to the node and indicates that you should correct a problem on the affected node before proceeding. To resolve problems, examine Oracle Universal Installer actions recorded in the installation log file. The installation log file is:

\texttt{oraInventory:[logs]installActions\_date\_time.log}

You can either make corrections and click \textbf{Next}, or you can deselect nodes that have errors and click \textbf{Next}. When you click Next, Oracle Universal Installer displays the Select Installation Type screen.

\textbf{Note:} Each node in a cluster must be able to see the CRS home to enable the CRS to operate on each node. However, the Oracle home can be on a subset of the nodes that are part of the installation.

6. On the Select Installation Type screen, you can select Enterprise Edition, or Custom Install type. If you select Enterprise Edition, then the installation will include the components related to the chosen edition. If you select the Custom install, then select the individual components that you want to install from the list of available components.

After you make the selection and click \textbf{Next} on the Select Installation Type screen, Oracle Universal Installer displays one of the following screens depending on the configuration and selections:

- Upgrading an Existing Database screen: This screen is displayed if Oracle Universal Installer detects a previous release of the database.
- Select Database Configuration screen: This screen is displayed if no previous release of the database exists.

7. When you click \textbf{Next}, the screen that Oracle Universal Installer displays depends on the configuration and selection options as follows:

- Upgrading an Existing Database screen: This screen is displayed if Oracle Universal Installer detects a previous release of the database.
- Available Products Components screen: This screen is displayed if you selected a Custom install.
- Select Database Configuration screen: This screen is displayed if you did not select a Custom install and there is no database to upgrade.

\textbf{Note:} Database Upgrade Assistant is not supported on this release of Oracle on OpenVMS Alpha. To upgrade a database, refer to the steps for manually upgrading a database in \textit{Oracle Database Upgrade Guide} (B10763-02).

8. On the Upgrading an Existing Database screen, you can select to upgrade one or more existing databases or continue with the installation without performing any upgrades. If you wish to upgrade an existing database, then select \textbf{Upgrade an Existing Database} and then select the databases to upgrade from the list provided. If you prefer not to upgrade any of the listed databases, then leave the \textbf{Upgrade an Existing Database} check box unselected.
If you selected **Upgrade an Existing Database**, then Oracle Universal Installer continues to the Summary screen when you click **Next**. If you did not select **Upgrade an Existing Database**, then Oracle Universal Installer continues with the Select Database Configuration screen when you click **Next**.

9. On the Available Products Components screen, select the components you want to install and click **Next**. This opens the Component Locations screen in some cases, such as when insufficient disk space is available. Specify a location for the installation and click **Next**. Oracle Universal Installer will display the Privileged Operating System Groups screen described in Step 16.

10. The Select Database Configuration screen, provides options for you to create a preconfigured database as part of the installation process or to install the software without creating a database. If you want to create a database as part of the installation, then select General Purpose, Transaction Processing, Data Warehouse, or Advanced. If you only want to install the software, then select **Do not create a starter database**. Click **Help** for more information about these choices.

    If you choose to create a General Purpose, Transaction Processing, or a Data Warehouse database, then when you click **Next**, Oracle Universal Installer displays the Specify Database Configuration Options screen. If you select the Advanced option or select **Do not create a starter database**, then when you click **Next**, Oracle Universal Installer displays the Privileged Operating System Groups screen.

11. On the Specify Database Configuration Options screen, enter a global database name. A global database name is a name that includes the database name and database domain, such as `db.us.acme.com`. The name that you enter on this screen must be unique among all the global database names used in the environment. Accept or change the common prefix for the Oracle SID for each instance. Each instance has an SID that comprises the common prefix that you enter in this step and an instance ID that is automatically generated. Note that an SID prefix cannot exceed five characters. Also select a database character set, select any database examples to install from the Sample Schemas.

    When you click **Next** on the Specify Database Configuration Options screen, Oracle Universal Installer displays the Select Database Management Option screen.

12. If you perform an installation that does not include Enterprise Manager, for example, a custom software install without Enterprise Manager, an installation with no Enterprise Manager configuration, or a database creation with your scripts, then you can configure Enterprise Manager later with Oracle Universal Installer, DBCA, or the Enterprise Manager Configuration Assistant (EMCA) utility.

    **See Also:**  *Enterprise Manager Grid Control Installation and Basic Configuration* for details about installing Grid Control with Oracle Universal Installer utility and *Enterprise Manager Advanced Configuration Guide* for details about installing Grid Control with DBCA and the EMCA utilities

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**Note:** When DBCA displays a list of databases to upgrade, it may display duplicate entries for the same database. In this case, an additional entry will be displayed consisting of the database name that contains uppercase characters. You can select either of the entries to proceed with upgrading the database.

---
When you click **Next** on the Select Database Management Option screen, Oracle Universal Installer displays the Specify Database File Storage Option screen.

13. Select a data storage option on the Specify Database File Storage Option screen. Enter the full path of the location for the data files destination on the file system and click **Next**. Oracle Universal Installer displays the Specify Backup and Recovery Options screen.

14. If you enable backup on the Specify Backup and Recovery Options screen, then you can select File System. You must also enter the user name and password.

15. On the Specify Database Schema Passwords screen, you can select different passwords for the **SYS**, **SYSTEM**, **DBSNMP**, and **SYSMAN** accounts, or you can select one password for all of the privileged accounts. When you click **Next** on the Specify Database Schema Passwords screen, the next screen that Oracle Universal Installer displays depends on the configuration and selection options as follows:
   - If the user does not have **ora_dba** right identifier, then the next screen is the Privileged Operating System Groups screen.
   - If the user has **ora_dba** right identifier, then the next screen is the Summary screen.

16. On the Privileged Operating System Groups screen, you enter the group name for the **SYSDBA** and **SYSOPER** users. When you click **Next** on the Privileged Operating System Groups screen, Oracle Universal Installer displays the Create Database screen, which you can ignore if you are upgrading. Finally, Oracle Universal Installer proceeds to the Summary screen.

17. The Summary screen displays the software components that Oracle Universal Installer will install and the space available in the Oracle home with a list of the nodes that are part of the installation session. Verify the installation details that are displayed on the Summary screen, and then click **Install** to continue with the installation or click **Back** to revise the installation.

18. Review the information about the VIPCA Welcome screen, click **Next**, and then the VIPCA displays the Public Network Interfaces screen.

19. On the Public Network Interfaces screen determine the network interface cards (NICs) to which you want to assign your public virtual IP addresses, click **Next**, and the VIPCA displays the IP Address screen.

20. On the IP Address screen enter an unassigned public virtual IP address for each node displayed on this screen and click **Next**. After you click **Next**, the VIPCA displays the Summary screen. Review the information on this screen and click **Finish**.

---

**Note:** On any screen, you can click **Finish** to directly end the installation.

---

A progress dialog box is displayed while the VIPCA configures the virtual IP addresses with the network interfaces that you select. The VIPCA then creates and starts the virtual IP addresses, GSD, and Oracle Notification Service (ONS) node applications. When the configuration completes, click **OK** to see the VIPCA session results. Review the information on the Configuration Results screen, and click **Exit** to exit the VIPCA.
21. Click **OK** on Oracle Universal Installer dialog box to continue the installation. This enables the remaining Oracle configuration assistants to run in the order shown in the following list so that the assistants can perform postinstallation processing:

- **NETCA**
- **DBCA**

At the end of the database creation, DBCA configures the Grid Control Agent.

With this you complete the second and final phase of the installation. Proceed to Section 5.15, "Postinstallation Procedures for RAC" to perform the postinstallation tasks.

---

**Note:**

- If you need to change the virtual IP address on a RAC node, then you should use the following command:

  
  ```bash
  srvctl modify nodeapps -A new_address
  ```

  where **new_address** is defined in Appendix B of the **Oracle Real Application Clusters Administration and Deployment Guide** (B14197-01).

- Use DBCA and Oracle Universal Installer to uninstall RAC.

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### 5.15 Postinstallation Procedures for RAC

The following sections describe how to complete the postinstallation tasks after you have installed Oracle Database 10g with Oracle Real Application Clusters (RAC) software.

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**Note:** This chapter only describes postinstallation tasks for basic configurations. Refer to the **Oracle Database Administrator’s Reference** (B13738-01), and the product administration and tuning guides for more detailed configuration and tuning information.

---

You must perform the following tasks after completing the installation:

- **Section 5.15.1, "Back Up the Voting Disk After Installation"**
- **Section 5.15.2, "Downloading and Installing Patches"**
- **Section 5.15.3, "Configuring Oracle Products"**
- **Section 5.15.4, "Verifying Enterprise Manager Operations"**
- **Section 5.15.5, "Setting Up Users Accounts After Installation"**

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### 5.15.1 Backing Up the Voting Disk After Installation

After the Oracle Database 10g with RAC installation is complete and after you are sure that the system is functioning properly, make a backup of the contents of the voting disk. Also make a backup of the voting disk contents after you complete any node additions or node deletions and after running any deinstallation procedures.
5.15.2 Downloading and Installing Patches

Refer to the Oracle MetaLink Web site for required patches for the installation. To download required patches:

1. Use a Web browser to view the Oracle MetaLink Web site:
   
   \[http://metalink.oracle.com\]

2. Log on to Oracle MetaLink.

   \[Note: If you are not an Oracle MetaLink registered user, then click Register for MetaLink and register.\]

3. On the main Oracle MetaLink screen, click Patches.


6. On the Advanced Search screen, click the search icon next to the Product or Product Family field.

7. In the Search and Select: Product Family field, enter RDBMS Server in the For field and click Go.

8. Select RDBMS Server under the Results heading, and click Select.

   RDBMS Server is displayed in the Product or Product Family field and the current release is displayed in the Release field.

9. Select the platform from the list in the Platform field and click Go.

10. All available patches are displayed under the Results heading. Click the number of the patch that you want to download.

11. On the Patch Set screen, click View README and read the contents of the screen that is displayed. The README screen contains information about the patch set and how to apply the patches to the installation.

12. Return to the Patch Set screen, click Download, and save the file on the system.

13. Use the unzip utility provided with Oracle Database 10g to uncompress the Oracle patches that you downloaded from Oracle MetaLink.

5.15.3 Configuring Oracle Products

Many Oracle products and options must be configured before you use them for the first time. Before using individual Oracle Database 10g products or options, refer to the manual in the product documentation library which is available on the documentation CD-ROM or on the Oracle Technology Network Web site at

\[http://www.oracle.com/technology\]

5.15.4 Verifying Enterprise Manager Operations

On all systems, you must run the following command to verify the Enterprise Manager configuration in the newly installed Real Application Clusters environment:

```
svctl config database -d db_name
```
This command (`srvctl`) displays the name of the node and the instance for the node. The following example shows a node named `db1-server` running an instance named `db1`. Run the following command:

```
srvctl config database -d db
```

The output should be similar to:

```
db1-server db1 /private/system/db
db2-server db2 /private/system/db
```

### 5.15.5 Setting Up Users Accounts After Installation

Oracle recommends that you complete this task after installing Oracle Real Application Clusters (RAC).

**See Also:** For information about setting up additional optional user accounts, refer to the *Oracle Database Administrator’s Reference* (B13738-01)

When you complete these procedures, proceed with the initial configuration tasks described in Section 6.8, "Configuring RAC".

### 5.16 Uninstalling RAC Software

A successful uninstallation of Oracle software from a cluster requires you to run Oracle Universal Installer from the same node that was used for the initial installation. This is required for the RAC and for the CRS software uninstallations. To determine the node used for the installation, perform the following steps:

1. Navigate to the Oracle home directory if you are uninstalling RAC software or to the CRS home directory if you are uninstalling CRS software.
2. Start Oracle Universal Installer as follows:
   ```
   $ @ora_root:[oui.bin]runinstaller.com
   ```
3. Click **Installed Products**...
4. Expand the navigation tree for the Oracle home or the CRS home you wish to uninstall.
5. In the cluster node tree that lists the nodes on which this home is installed, the first node listed is the node on which the install was performed. This is the node where you should run Oracle Universal Installer in the following procedures.

Once you have identified the node where the software was installed, perform the following procedures to uninstall Oracle Database 10g RAC and CRS software. You must uninstall Oracle Database software first before uninstalling the Cluster Ready Services (CRS) software. The steps to complete these uninstallation tasks are described in the following sections:

- **Section 5.16.1, "Procedure for Removing RAC Software"**
- **Section 5.16.2, "Uninstalling Cluster Ready Services (CRS)"**
Uninstalling RAC Software

Note: The following sections describe a complete uninstallation of the RAC, and CRS software.

If you have multiple Oracle homes on the cluster, then check for any dependencies that may affect the other databases. Such dependencies can include listeners that run in the Oracle home to be deleted. To identify dependencies, review the oratab file to identify common Oracle homes.

See Also: Oracle Real Application Clusters Administration and Deployment Guide (B14197-01) for more information about using RAC scalability features, adding and deleting nodes and instances from RAC databases, and viewing OCR content.

5.16.1 Procedure for Removing RAC Software

This section describes the procedure to uninstall Oracle Database 10g RAC. Before you perform these steps, consider making a backup of any databases that run from the Oracle home you are about to delete. You should then stop any instances and processes on all nodes, including services on Microsoft Windows-based systems, that depend on the software being uninstalled.

1. Delete all of the databases that are dependent on the Oracle home that you are deleting by using the DBCA **Delete a database** option.

2. If the listener runs from this Oracle home, then use the NETCA to remove the listener and its configuration.

3. If the CRS node applications for virtual IP address, ONS, and GSD were created in this Oracle home, then you can remove them and re-create them in another Oracle Database 10g Oracle home, or you can modify the Oracle home for these applications so that they use an alternate Oracle Database 10g Oracle home. Both of these alternative procedures are described in the following two points.

Perform one of the following procedures:

- Stop and remove the CRS node applications on each node that is associated with the Oracle home that you are deleting. Do this by running the command
  
  ```bash
  srvctl stop nodeapps -n node_name
  ```
  
  for all of the nodes that are affected by the deletion of the Oracle home. Then remove the CRS node applications by running the following command:

  ```bash
  @ora_root:[install]
  rootdeletenode.com
  ```

  Respond to any operating system prompts to confirm your operations for each node. If other Oracle Database 10g RAC Oracle homes exist, then re-create the node applications in that Oracle home by running the command

  ```bash
  srvctl create nodeapps
  ```

- Alternatively, you can modify the CRS node application Oracle home by running the following command:

  ```bash
  srvctl modify nodeapps -o oracle_home
  ```
4. After you complete the previous steps in this procedure, run Oracle Universal Installer and on the Welcome screen, click **Deinstall Products** to display the list of installed products on which you can select the Oracle home to uninstall.

**Note:** You cannot perform a RAC installation from the same Oracle Universal Installer session in which you perform a RAC uninstallation. In other words, if you uninstall RAC with Oracle Universal Installer and want to perform another RAC installation, then you must start a new Oracle Universal Installer session.

### 5.16.2 Uninstalling Cluster Ready Services (CRS)

Uninstall each Oracle Database 10g RAC home by running the procedure in Section 5.16.1, "Procedure for Removing RAC Software". Then complete the procedure by removing the CRS software.

#### 5.16.2.1 Uninstalling Cluster Ready Services from OpenVMS Environments

To uninstall the CRS software from a OpenVMS environment:

1. Run the command `@ora_root:[install]rootdelete` from the CRS Home to disable the CRS applications that are running on the cluster node. The `rootdelete.com` script requires three arguments. If you are running this command on a remote node of the cluster, then use `remote` as the first argument. Otherwise, use `local` as the first argument. For the second argument, if the `ocr.loc` file is on a shared file system, then use `sharedvar`, otherwise use `nosharedvar` as the second argument. If the CRS home is on a shared file system, then use `sharedhome`, otherwise use `nosharedhome` as the third argument. Repeat this step on each node of the cluster from which you want to uninstall CRS.

2. Run the script `ORA_ROOT:[install]rootdeinstall.com` on a local node from the CRS home to remove the OCR.

3. Run Oracle Universal Installer and in the Welcome screen, click **Deinstall Products** to display the list of installed products on which you can select the CRS home to uninstall.

**Note:** A node is a local node if you plan to run Step 2 and Step 3 on that node.
This chapter provides an overview of the procedures for configuring Oracle Database 10g Real Application Clusters (RAC) on OpenVMS.

You may also need to refer to the following RAC documents for more complete information about installing and administering RAC on OpenVMS:

- Oracle Real Application Clusters Installation and Configuration Guide (B10766-08)
- Oracle Real Application Clusters Administration and Deployment Guide (B14197-01)
- Oracle Real Application Clusters Deployment and Performance Guide (B10768-02)

This chapter includes the following topics:

- Section 6.1, "Creating Directories"
- Section 6.2, "Using DBCA for RAC"
- Section 6.3, "Benefits of Using DBCA"
- Section 6.4, "Real Application Clusters High-Availability Services"
- Section 6.5, "Creating the Database After Installation By Using DBCA"
- Section 6.6, "Creating a RAC Database By Using DBCA"
- Section 6.7, "Deleting a RAC Database By Using DBCA"
- Section 6.8, "Configuring RAC"
- Section 6.9, "Parameter Files and RAC"
- Section 6.10, "Using Server Parameter Files in RAC"
- Section 6.11, "Parameter File Search Order in RAC"
- Section 6.12, "Upgrading to the Server Parameter File in RAC Environments"
- Section 6.13, "Server Parameter File Errors in RAC"
- Section 6.14, "Understanding the RAC Installed Configuration"
- Section 6.15, "Database Components Created Using DBCA"
- Section 6.16, "Managing Undo Tablespaces in RAC"
- Section 6.17, "Configuring Service Registration-Related Parameters in RAC"
- Section 6.18, "Configuring the Listener File (listener.ora)"
- Section 6.19, "Directory Server Access (ldap.ora File)"
- Section 6.20, "Net Service Names (tnsnames.ora File)"
- Section 6.21, "Profile (sqlnet.ora File)"
6.1 Creating Directories

If you decide to place the Oracle Cluster Ready Services (CRS), database, or recovery files on a file system, then use the following guidelines when deciding where to place them.

- Section 6.1.1, "Guidelines for Placing Oracle CRS Files on a File System"
- Section 6.1.2, "Guidelines for Placing Oracle Database Files on a File System"
- Section 6.1.3, "Guidelines for Placing Oracle Database Recovery Files on a File System"
- Section 6.1.4, "Creating Required Directories"

6.1.1 Guidelines for Placing Oracle CRS Files on a File System

Oracle Universal Installer does not suggest a default location for the Oracle Cluster Registry (OCR) or the Oracle CRS voting disk. If you choose to create these files on a file system, use the following guidelines when deciding where to place them:

- You must choose a disk mounted and available on all the nodes in the RAC cluster.
- It must have at least 100 MB of free disk space for the OCR and 20 MB of free disk space for the CRS voting disk.
- For improved reliability, you should choose a file system on a highly available storage device, for example, a RAID device that implements mirroring.
- The oracle user must have write permissions to create the files in the path that you specify.

6.1.2 Guidelines for Placing Oracle Database Files on a File System

If you choose to place the Oracle Database files on a file system, use the following guidelines when deciding where to place them:

- You must select a disk that is accessible across all the nodes in the RAC cluster.
- The default path suggested by Oracle Universal Installer for the database file directory is a subdirectory of the Oracle home directory. This default location is not recommended for production databases.
- Choose a set of disks dedicated to the database.
  
  For best performance and reliability, choose a RAID device or a logical volume on more than one physical device and implement the stripe-and-mirror-everything (SAME) methodology.

  This method enables you to distribute physical I/O and create separate control files on different devices for increased reliability. You must choose either the Advanced database creation option or the Custom installation type during the installation to implement this method.

- If you intend to create a preconfigured database during the installation, the file system (or file systems) that you choose must have at least 1.2 GB of free disk space.
  
  For production databases, you must estimate the disk space requirement depending on the use that you want to make of the database.

- For optimum performance, the file systems that you choose should be on physical devices that are used only by the database.
The oracle user must have write permissions to create the files in the path that you specify.

6.1.3 Guidelines for Placing Oracle Database Recovery Files on a File System

Note: You must choose a location for recovery files only if you intend to enable automated backups during the installation.

If you choose to place the Oracle Database recovery files on a file system, use the following guidelines for placement of Oracle Database recovery files on the file system:

- To prevent disk failure from making both the database files and the recovery files unavailable, place the recovery files in a file system on a different physical disk from the database files.
- You should choose a device that is accessible on all the nodes of the RAC cluster.
- The device that you choose should have at least 2 GB of free disk space. The disk space requirement is the default disk quota configured for the flash recovery area (specified by the DB_RECOVERY_FILE_DEST_SIZE initialization parameter).
- If you choose the Custom installation type, then you can specify a different disk quota value. After you create the database, you can also use Oracle Enterprise Manager Grid Control to specify a different value.

See Also: For more information about sizing the flash recovery area, refer to Oracle Database Backup and Recovery Basics (B10735-01)

- The default path suggested by Oracle Universal Installer for the flash recovery area is a subdirectory of the Oracle home directory. You can choose this path only if you are using an Oracle Database base directory that is on a shared file system. This default location is not recommended for production databases.
- The oracle user must have write permissions to create the files in the path that you specify.

6.1.4 Creating Required Directories

Note: You must perform this procedure only if you want to place the Oracle CRS, database, or recovery files on a file system other than where the corresponding installations were created.

To create directories for the Oracle CRS, database, or recovery files on separate file systems from the installations:

1. If necessary, configure the disks that you want to use and mount them on each node.
2. Use the `show device` command to determine the free disk space on each mounted file system.
3. From the display, identify the file systems that you want to use. Table 6–1 lists the disk space requirements for each file type.
If you are using the same disk for more than one type of file, then add the disk space requirements for each type to determine the total disk space requirement.

4. Note the names of the root device directories for the disks that you identified.

5. Enter commands similar to the following to create the recommended subdirectories in each of the root device directories:

   - CRS file directory
     
     ```
     $ create/dir/own=oinstall root_device:[oracrs]
     ```

   - Database file directory
     
     ```
     $ create/dir/own=oinstall root_device:[oradata]
     ```

   - Recovery file directory (flash recovery area)
     
     ```
     $ create/dir/own=oinstall root_device:[flash_recovery_area]
     ```

6.2 Using DBCA for RAC

The primary functions of the Database Configuration Assistant (DBCA) processing include:

- Creating the database and its instances
- Setting up network configuration for the database, its instances, and database services
- Starting the database, its instances, services, and any other node applications

See Also:

- Section 6.5, "Creating the Database After Installation By Using DBCA" for more information about using DBCA in standalone mode
- Oracle Database Net Services Administrator’s Guide if you experience problems (for example, with the listener configuration), and for more information about Lightweight Directory Access Protocol (LDAP)-compliant directory support

6.3 Benefits of Using DBCA

Oracle recommends that you use DBCA to create a RAC database, because DBCA preconfigured databases optimize the environment for features such as the server parameter file and automatic undo management.

Table 6–1  File Types and Their Disk Space Requirements

<table>
<thead>
<tr>
<th>File Type</th>
<th>File System Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRS files</td>
<td>Choose a file system with at least 120 MB of free disk space</td>
</tr>
<tr>
<td>Database files</td>
<td>Choose either:</td>
</tr>
<tr>
<td></td>
<td>- A single file system with at least 1.2 GB of free disk space</td>
</tr>
<tr>
<td></td>
<td>- Two or more file systems with at least 1.2 GB of free disk space in total</td>
</tr>
<tr>
<td>Recovery files</td>
<td>Choose a file system with at least 2 GB of free disk space.</td>
</tr>
</tbody>
</table>
By using DBCA, you can create site-specific tablespaces as a part of database creation. If you have data file requirements that differ from those offered by DBCA templates, then create the database with DBCA and modify the data files later. You can also run user-specified scripts as part of the database creation process.

DBCA also configures the RAC environment for various Oracle Database high-availability features such as services and cluster administration tools. It also starts any database instances required to support the defined configuration.

6.4 Real Application Clusters High-Availability Services

When you configure high-availability services with DBCA Database Services screen, you can also configure service instance preferences and transparent application failover (TAF) policies. These are described in the following subsections:

- Section 6.4.1, "Service Configuration and Instance Preferences"
- Section 6.4.2, "Transparent Application Failover Policies"

6.4.1 Service Configuration and Instance Preferences

Use the Database Services screen button in the column labeled Not Used, Preferred, or Available to configure service instance preferences as described in the following list:

- Preferred: The service runs primarily on the selected instance
- Available: The service may run on the instance if a preferred instance fails
- Not Used: The service never runs on the instance

6.4.2 Transparent Application Failover Policies

Use the DBCA Database Services screen to configure TAF failover policies. The DBCA Database Services screen also has a TAF policy selector row under the instance preference display. Make a selection in this row for your failover and reconnection policy preference as described in the following list:

- None: Do not use TAF
- Basic: Establish connections at failover time
- Preconnect: Establish one connection to a preferred instance and another connection to a backup instance that you have selected to be available

6.5 Creating the Database After Installation By Using DBCA

To create a database by using DBCA in standalone mode, you must run the Oracle Net Configuration Assistant to configure the Oracle Net listener.ora file. To start DBCA, connect to one of the nodes with Oracle Real Application Clusters (RAC) installed and then enter the dbca command from the command line.

6.6 Creating a RAC Database By Using DBCA

The first screen that DBCA displays is the Welcome screen for RAC. DBCA displays this RAC-specific Welcome screen only if the Oracle Database home from which it is started is cluster installed.

If DBCA does not display the Welcome screen for RAC, then DBCA was not able to detect whether or not the Oracle home is cluster installed. In this case, verify that
oraInventory is not damaged and that Oracle Universal Installer inventory, oraInst.loc, is present. By default, this file is placed in a directory that has the same name as the node from where the installation was performed, which, in most cases, is the primary node of the RAC cluster. This directory is in the login directory of the user who carried out the installation. Otherwise, perform the following steps to create a RAC database:

1. Select Real Application Clusters database, click Next, and DBCA displays the Operations screen. DBCA enables the Configure Database Options, Delete a database, Instance Management, and Services Management options only if there is at least one RAC database configured on the cluster that runs from the Oracle Database home.

2. Select Create a database and click Next, and DBCA displays the Node Selection screen.

3. DBCA highlights the local node by default. Select the other nodes that you want to configure as members of the cluster database, click Next, and DBCA displays the Database Templates screen. If nodes that are part of the cluster installation are not displayed on the Node Selection screen, then perform inventory diagnostics and CRS diagnostics by running the olsnodes command.

4. The templates on the Database Templates screen are Custom Database, Transaction Processing, Data Warehouse, and General Purpose. The Custom Database template does not include data files or options specially configured for a particular type of application. Use one of the other templates, which include data files, if you want to create a database with specifically configured options. Select the template from which you wish to create the cluster database, click Next, and DBCA displays the Database Identification screen.

5. Enter the global database name and the Oracle Database system identifier (SID) prefix for the cluster database, click Next, and DBCA displays the Management Options screen.

---

**Note:** The global database name can be up to 30 characters in length and must begin with an alphabetic character. The SID prefix must begin with an alphabetic character and contain no more than 5 characters on OpenVMS-based systems. DBCA uses the SID prefix to generate a unique value for the ORACLE_SID for each instance.

---

6. On the Management Options screen, you can choose to manage the database with Enterprise Manager. Despite choosing the Grid Control option, this will only configure EMAgent on OpenVMS. The Console component of Grid Control is not supported on OpenVMS platform. Refer to Appendix E, "Installing, Configuring, and Running EMAgent" for more information about how to configure the EMAgent for use with the Grid Control Enterprise Manager, and how to manage and maintain the EMAgent for the OpenVMS platform.

Click Next, and DBCA displays the Database Credentials screen.

7. Enter the passwords for the database on the Database Credentials screen. You can enter the same or different passwords for the users SYS and SYSTEM, plus DBSNMP and SYSMAN if you selected Enterprise Manager on the Management Options screen. Select the **Use the Same Password for All Accounts** option to assign the same password to the listed users. Alternatively, provide a different password for
each of these users by selecting the **Use Different Passwords** option. Enter the password information, click **Next**, and DBCA displays the Storage Options screen.

8. Use the Storage Options screen to select a storage type for database creation. The Cluster File System option is the default. Select a storage option and click **Next** to proceed to the next screen. If you select Cluster File System, the Database File Locations screen is displayed.

9. The Database File Locations screen enables you to select the file storage for the database files: locations provided in a template, a common location for all database files (the files will not be Oracle Database-managed files), or Oracle Database-managed files in a common location. If you do not select the template option, then you can enter an existing directory path name in the space provided, or click **Browse** to open a selection list.

If you wish to multiplex the database redo log files and control files, click **Multiplex Redo Logs and Control Files** and provide the location for each copy you want. Click **Ok** when you have defined the multiplex locations to return to the Database File Locations screen.

You can also define variables for the file locations if you plan to use the Database Storage screen, explained in Step 14, to define individual file locations.

10. On the Recovery Configuration screen, you can select redo log archiving by selecting **Enable Archiving**. You can also select the flash recovery area and size on the Recovery Configuration screen. The flash recovery area defaults to @ora_root:[flash_recovery_area].

If you wish to multiplex the database redo log files and control files, you can also define variables for the file locations if you plan to use the Database Storage screen, explained in Step 14, to define individual file locations. When you have completed the entries, click **Next**, and the Database Content screen is displayed.

11. On the Database Content screen, if you chose the Custom Database option, you can select or deselect the database components and their corresponding tablespace assignments. For a seed database, you can select whether to include the sample schemas in the database and to run custom scripts as part of the database creation processing. After completing the selections, click **Next** to display the Databases Services screen.

12. To create services on the Database Services screen, expand the **Services** tree. Oracle Database displays the global database name in the top left corner of the screen. Select the global database name and click **Add** to add services to the database. Enter a service name in the **Add a Service** dialog box, and click **OK** to add the service and return to the Database Services screen.

The service name is displayed under the global database name. Select the service name and DBCA displays the service preferences for the service on the right side of the DBCA Database Services screen. Change the instance preference (Not Used, Preferred, or Available) and transparent application failover (TAF) policies for the service as needed.

Repeat this procedure for each service and when you are done configuring services for the database, click **Next**. DBCA displays the Initialization Parameters screen.

13. By default, the Initialization Parameters screen shows only the basic parameters and only enables you to change the parameter file definition if you are using raw storage. Each tab on the Initialization Parameters screen provides different sets of information that you can add or modify as follows:
a. Memory Tab

Click **Typical** for default values based on the database type you selected or **Custom** to set values for the memory parameters. You can also see values for the advanced parameters by clicking **All Initialization Parameters**.

Carefully review the parameter settings displayed in this dialog box because DBCA configures these settings in the server parameter file. Instance-specific parameter settings for the RAC database are displayed at the bottom of this dialog box. The sid prefixes for these entries are displayed in the left column.

To review the instance-specific parameter settings, scroll downward using the scroll bar on the right side of the dialog box. Use the check box in the **Override Default** column to indicate that DBCA should place the parameter setting in the server parameter file. DBCA only places a parameter entry into the server parameter file if the entry displays a check mark in the **Override Default** column of the **All Initialization Parameters** dialog box.

---

**Note:**

- You cannot modify the value of sid in the Instance column.
- You can alter self-tuning parameters with this dialog box. However, setting these parameters to inappropriate values may disable Oracle Database self-tuning features.
- You cannot specify instance-specific values for global parameters with DBCA.
- You should set the value of the `CLUSTER_DB_INSTANCES` parameter to the number of instances you intend to use in the cluster if you are not including all the related nodes during the current DBCA session.
- If the global database name is longer than eight characters, then the database name value (in the `db_name` parameter) is truncated to the first eight characters and the `DB_UNIQUE_NAME` parameter value is set to the global name.

---

b. Sizing Tab

Use this screen to select the database standard block size and process count.

c. Character Sets Tab

Use this screen to set the database character set value.

d. Connection Mode Tab

You can use this tab to select either dedicated or shared database connections to the database.

When you have specified all the information on the Initialization Parameters screen, click **Next**, and the Database Storage screen is displayed.

14. If you selected a preconfigured database template, such as the General Purpose template, then DBCA displays the control files, data files, and redo logs on the Database Storage screen. Select the folder and the file name underneath the folder to edit the file name. However, if you selected the Custom Database template, the template without data files, then DBCA displays the control files, tablespaces, data files, and redo logs. To change the tablespace properties, such as the data file or
the tablespace size, click the tables icon to expand the object tree on the left side of the screen and click the tablespace. The tablespace property dialog box is displayed on the right side. Make the changes, and click Ok.

After you specify all the information on the Database Storage screen, click Next, and DBCA displays the Creation Options screen.

15. On the Creation Options screen, select one of the following database options and click Finish.
   - Create Database: Creates the database
   - Save as a Database Template: Creates a template that records the database structure, including user-supplied inputs, initialization parameters, and so on. You can later use this template to create a database.
   - Generate Database Creation Scripts: Generates database creation scripts. DBCA only displays this option if you selected the Custom Database template.

After you click Finish, DBCA displays a Summary dialog box.

16. Review the Summary dialog box information and click Ok to create the database.

After you complete Step 16, DBCA performs the following steps:
   - Creates an operative RAC database and its instances
   - Creates the RAC data dictionary views
   - Configures the network for the cluster database
   - Starts the listeners and database instances and then starts the high-availability services

6.7 Deleting a RAC Database By Using DBCA

This section explains how to delete a RAC database by using DBCA. This process deletes a database and removes the initialization parameter files, instances, and Oracle net configuration of the database.

To delete a database by using DBCA:

1. Start DBCA on one of the nodes by running the dbca command at the DCL command prompt.
2. Select Oracle Real Application Clusters and click Next.

   After you click Next, DBCA displays the Operations screen.

3. Select Delete a database, click Next, and DBCA displays the List of Cluster Databases screen.
4. If your user ID and password are not authenticated by the operating system, then the List of Cluster Databases screen displays the user name and password fields. If these fields are displayed, then enter a user ID and password that has SYSDBA privileges.
5. Select the database to delete and click Finish.

   After you click Finish, DBCA displays a dialog box to confirm the database and instances that DBCA is going to delete.

6. Click Ok to begin the deletion of the database and its associated files, services, and environment settings, or click Cancel to stop the operation.
When you click **Ok**, DBCA continues the operation and deletes all of the associated instances for this database. The DBCA also removes the parameter files, password files, and oratab entries.

At this point, you have accomplished the following:
- Deleted the selected database from the cluster
- Deleted high-availability services that were assigned to the database
- Deleted the Oracle net configuration for the database
- Deleted the data files

### 6.8 Configuring RAC

The following sections describe how to use the server parameter file ([spfile](#)) in Oracle Database 10g Real Application Clusters (RAC) as well as how to configure RAC once it has been installed.

**See Also:** The [Oracle Real Application Clusters Administration and Deployment Guide](#) (B14197-01) for more information about parameters and the [Oracle Real Application Clusters Deployment and Performance Guide](#) (B10768-02) for a discussion of parallel execution-related parameters in RAC data warehouse environments.

### 6.9 Parameter Files and RAC

Oracle Database uses parameter settings in parameter files to determine how to control various database resources. You can use two types of files for parameter administration: the server parameter file ([spfile](#)) or one or more traditional client-side parameter files.

Oracle recommends that you administer parameters using [spfile](#). If you use client-side parameter files, then Oracle Database does not preserve parameter changes made for self-tuning after shutdown.

**See Also:** The [Oracle Database 10g Real Application Clusters](#) documentation for more information about using client-side parameter files.

### 6.10 Using Server Parameter Files in RAC

By default, Oracle Database creates the server parameter file based on one [spfile](#). You can change parameter settings in the server parameter file only by using Oracle Enterprise Manager or **ALTER SYSTEM SET** SQL statements; the server parameter file is a binary file that you should not edit.

**Note:** Oracle recommends that you avoid modifying the values for self-tuning parameters. Overriding these settings can adversely affect performance.

If you are upgrading from a previous Oracle Database release, then create and configure the server parameter file for RAC using the procedures described in the following section.
6.10.1 Location of the Server Parameter File

The default location of the server parameter file on an OpenVMS-based system is:

`ORA_ROOT:[DBS]spfilesid.ora`

Oracle recommends that you use a `PFILE` in this directory:

`ORA_ROOT:[dbs]init$ORACLE_SID.ora`

To use DBCA to create the database and to use the server parameter file, on the Initialization Parameters screen select **Create server parameter file** (spfile) under the File Locations tab, which is visible only if you are using raw storage. Then enter a shared file system file name in the Server Parameters Filename field.

---

**Note:** When you use DBCA to create the server parameter file, the default PFILE file name is `ORA_ROOT:[dbs]init$ORACLE_SID.ora` on OpenVMS-based systems. This is the default PFILE name.

6.11 Parameter File Search Order in RAC

Oracle Database searches for the parameter file in the following order:

1. `ORA_ROOT:[oradata.$ORACLE_SID]spfilesid.ora`
2. `ORA_ROOT:[oradata.$ORACLE_SID]spfile.ora`
3. `ORA_ROOT:[DBS]init$ORACLE_SID.ora`

6.12 Upgrading to the Server Parameter File in RAC Environments

Upgrade to the server parameter file by creating and editing the server parameter file using the procedures described in this section.

- Section 6.12.1, "Server Parameter File Placement in Real Application Clusters"
- Section 6.12.2, "Procedures for Upgrading to the Server Parameter File"

6.12.1 Server Parameter File Placement in Real Application Clusters

For single-node cluster-enabled configurations, or if you are using a cluster file system, place the server parameter file on a file system.

6.12.2 Procedures for Upgrading to the Server Parameter File

Upgrade to the server parameter file by completing the following procedures:

1. Combine the initialization parameter files for all instances into one `initdbname.ora` file by copying all shared IFILE contents as is. All parameters defined in the IFILE parameter files are global. Therefore, create them as `parameter=value` without `sid` prefixes.

2. Copy all instance-specific parameter definitions from `init$ORACLE_SID.ora` files using the following syntax where `sid` is the `sid` of the instance:

   `sid.parameter=value`

3. Create the server parameter file using the `CREATE SPFILE` statement as in the following example:
CREATE SPFILE='ORA_DB:spfile_dbname.ora'
FROM PFILE='ora_root:[dbs]initdbname.ora'

4. Oracle recommends that you use the server parameter file by running the
STARTUP command as in this example:
STARTUP PFILE=ORA_ROOT:[DBS]initsid.ora

If you use this STARTUP command syntax, then Oracle Database uses the server
parameter file entry specified in initsid.ora.

6.13 Server Parameter File Errors in RAC

Oracle Database reports errors that occur during server parameter file creation or
while reading the file during startup. If an error occurs during a parameter update,
then Oracle Database records the error in the ALERT.LOG file and ignores subsequent
parameter updates to the file. If this happens, then do either of the following:

■ Shut down the instance, recover the server parameter file, and restart the instance.
■ Enable the instance to continue running without regard for subsequent parameter
updates.

Oracle Database displays errors for parameter changes that you attempt when you
incorrectly use the ALTER SYSTEM SET statement. Oracle Database does this when
an error occurs while reading from or writing to the server parameter file.

See Also: Oracle Real Application Clusters Administration and
Deployment Guide (B14197-01) for more information about backing
up the server parameter file

6.14 Understanding the RAC Installed Configuration

The following sections describe the RAC installed configuration:

■ Section 6.14.1, "Understanding the Configured Environment in RAC"
■ Section 6.14.2, "Oracle Cluster Registry in RAC"
■ Section 6.14.3, "OpenVMS oratab Configurations for Real Application Clusters"

6.14.1 Understanding the Configured Environment in RAC

The Oracle Net Configuration Assistant (NetCA) and DBCA configure the
environment to meet the requirements for database creation and Enterprise Manager
discovery of Real Application Cluster databases.

Note: Configuration files are created on each node in the cluster
database.

6.14.2 Oracle Cluster Registry in RAC

The DBCA uses the Oracle Cluster Registry (OCR) for storing the configurations for
the cluster databases that it creates. Oracle Universal Installer automatically initializes
the OCR during the CRS installation.
6.14.3 OpenVMS oratab Configurations for Real Application Clusters

Oracle Database creates an entry for each RAC database in the oratab configuration file. Oracle Enterprise Manager uses this file during service discovery to determine the name of the RAC database as well as whether or not the database should be automatically started on restart. The database entry has the following syntax:

\[ \text{db\_unique\_name:oracle\_home:N} \]

where \( \text{db\_unique\_name} \) is the database name for the RAC database, \( \text{oracle\_home} \) is the UNIX-style directory path to the database, and \( N \) indicates that the database should not be started at startup time. A sample entry for a database named \( \text{db} \) is:

\[ \text{db:private/system/db:N} \]

**Note:** The notation \( \text{db\_name} \) displayed in the preceding example and throughout this chapter refers to the database name you enter when prompted by DBCA, or it refers to the entry you made for the DATABASE keyword of the CREATE DATABASE statement.

6.15 Database Components Created Using DBCA

This section describes the database components that DBCA creates, which include:

- Section 6.15.1, "Tablespaces and Data Files"
- Section 6.15.2, "Control Files"
- Section 6.15.3, "Redo Log Files"

6.15.1 Tablespaces and Data Files

For both single-instance and cluster database environments, Oracle Database is divided into smaller logical areas of space known as tablespaces. Each tablespace corresponds to one or more data files stored on a disk. Table 6–2 shows the tablespace names used by a RAC database and the types of data they contain:

**Table 6–2  Tablespace Names Used by RAC Databases**

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM</td>
<td>Consists of the data dictionary, including definitions of tables, views, and stored procedures needed by the database. Oracle Database automatically maintains information in this tablespace.</td>
</tr>
<tr>
<td>SYSAUX</td>
<td>An auxiliary system tablespace that contains the DRYS (contains data for OracleText), ODM (for Oracle Data Mining), TOOLS (contains Enterprise Manager tables), INDEX, and EXAMPLE tablespaces.</td>
</tr>
<tr>
<td>USERS</td>
<td>Consists of application data. As you create and enter data into tables, Oracle Database fills this space with your data.</td>
</tr>
<tr>
<td>TEMP</td>
<td>Contains temporary tables and indexes created during SQL statement processing. You may need to expand this tablespace if you are running a SQL statement that involves significant sorting, such as ANALYZE COMPUTE STATISTICS on a very large table, or the constructs GROUP BY, ORDER BY, or DISTINCT.</td>
</tr>
<tr>
<td>UNDOTBS(n)</td>
<td>These are the undo tablespaces for each instance that DBCA creates for automatic undo management.</td>
</tr>
<tr>
<td>RBS</td>
<td>If you do not use automatic undo management, then Oracle Database uses the RBS tablespace for the rollback segments.</td>
</tr>
</tbody>
</table>
Managing Undo Tablespaces in RAC

You cannot alter these tablespace names when using the preconfigured database configuration options from Oracle Universal Installer. However, you can change the names of the tablespaces if you use the advanced database creation method.

As mentioned, each tablespace has one or more data files. The data file names created by the preconfigured database configuration options vary by operating system. Microsoft Windows-based platforms use the symbolic link names for the data file and other database files shown in Table 6–3.

<table>
<thead>
<tr>
<th>Microsoft Windows-Based Platforms Symbolic Link Names and Files</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microsoft Windows-Based Platforms Symbolic Link Names</strong></td>
</tr>
<tr>
<td><strong>Tablespace or Other Database Files</strong></td>
</tr>
<tr>
<td>db_name_system</td>
</tr>
<tr>
<td>db_name_SYSaux</td>
</tr>
<tr>
<td>db_name_users</td>
</tr>
<tr>
<td>db_name_temp</td>
</tr>
<tr>
<td>db_name_undotbs1</td>
</tr>
<tr>
<td>db_name_undotbs2</td>
</tr>
<tr>
<td>db_name_rbs</td>
</tr>
<tr>
<td>db_name_example</td>
</tr>
<tr>
<td>db_name_indx</td>
</tr>
<tr>
<td>db_name_spfile</td>
</tr>
<tr>
<td>db_name_control1</td>
</tr>
<tr>
<td>db_name_control2</td>
</tr>
<tr>
<td>db_name_redo_instance_number_instance_number_log_number</td>
</tr>
<tr>
<td>Where instance_number is the number of the instance and log_number is the log number (1 or 2) for the instance.</td>
</tr>
<tr>
<td>db_redo1</td>
</tr>
<tr>
<td>db_redo1_2</td>
</tr>
<tr>
<td>db_redo2</td>
</tr>
<tr>
<td>db_redo2_2</td>
</tr>
</tbody>
</table>

6.15.2 Control Files

The database is configured with two control files that are stored on shared storage.

6.15.3 Redo Log Files

Each instance is configured with at least two redo log files that are stored in the shared storage. If you selected cluster file system, then these files are shared file system files. The file names of the redo log files that are created with the preconfigured database configuration options vary by storage type.

6.16 Managing Undo Tablespaces in RAC

Oracle Database stores rollback or undo information in undo tablespaces. To manage undo tablespaces, Oracle recommends that you use automatic undo management.
Automatic undo management is an automated undo tablespace management mode that is easier to administer than manual undo management.

See Also: Oracle Real Application Clusters Administration and Deployment Guide (B14197-01) for more information about managing undo tablespaces

6.17 Configuring Service Registration-Related Parameters in RAC

Two key benefits of RAC are connection load balancing and failover. RAC extends the ability of single-instance Oracle Database load balancing, where connections are distributed among local dispatchers, to the balancing of connections among all instances in a cluster database. In addition, RAC provides failover by configuring multiple listeners on multiple nodes to manage client connection requests for the same database service. Connection load balancing and failover increase availability by taking advantage of the redundant resources within a cluster database. These features, however, require cross-instance registration.

Cross-instance registration in RAC occurs when the PMON process of an instance registers with the local listener and with all other listeners. Therefore, all instances in the cluster database register with all listeners running on nodes that run instances of the cluster database. This enables all listeners to manage connections across all instances for both load balancing and failover.

Cross-instance registration requires configuring the LOCAL_LISTENER and REMOTE_LISTENER initialization parameters. The LOCAL_LISTENER parameter identifies the local listener, and the REMOTE_LISTENER parameter identifies the global list of listeners. The REMOTE_LISTENER parameter is dynamic. Oracle Database changes the setting for REMOTE_LISTENER dynamically when you reconfigure the cluster database, for example, when you add or delete instances.

By default, DBCA configures the environment with dedicated servers. However, if you select the Shared server option on DBCA, then Oracle Database configures the shared server. In this case, Oracle Database uses both dedicated and shared server processing. When shared servers are configured, the DISPATCHERS parameter is specified as in the following example:

```
DISPATCHERS='(protocol=tcp)'  
```

If the DISPATCHERS initialization parameter does not specify the LISTENER attribute as in the previous example, then the PMON process registers information for all dispatchers with the listeners specified by the LOCAL_LISTENER and REMOTE_LISTENER parameters.

However, when the LISTENER attribute is specified, the PMON process registers dispatcher information with the listeners specified by the LISTENER attribute. In this case, setting the LISTENER attribute overrides REMOTE_LISTENER settings for the specified dispatchers as in the following example:

```
DISPATCHERS='(protocol=tcp)(listener=listeners_db_name)'  
```

See Also: Oracle Database Net Services Administrator’s Guide (B10775-01) for more information about cross-instance registration, shared and dedicated server configurations, and connection load balancing
6.18 Configuring the Listener File (listener.ora)

You can configure two types of listeners in the listener.ora file as described under the following headings:

- Section 6.18.1, "Local Listeners"
- Section 6.18.2, "Multiple Listeners"
- Section 6.18.3, "How Oracle Database Uses the Listener (listener.ora)"

6.18.1 Local Listeners

If you configured dedicated server mode by using the DBCA Connection Mode tab on the Initialization Parameters screen, then DBCA automatically configures the LOCAL_LISTENER parameter when the listener uses a nondefault address port.

If you configured the dedicated server mode by setting the REMOTE_LISTENER initialization parameter, then you must also configure the instance-specific LOCAL_LISTENER initialization parameter.

For example, to configure the LOCAL_LISTENER parameter, add the following entry to the initialization parameter file, where listener_sid is resolved to a listener address through either a tnsnames.ora file or through the Oracle Names Server:

```
sid.local_listener=listener_sid
```

The following entry should be in the tnsnames.ora file:

```
listener_sid=(address=(protocol=tcp)(host=node1-vip)(port=1522))
```

6.18.2 Multiple Listeners

If DBCA detects more than one listener on the node, it displays a list of the listeners. You can select one or all of these listeners with which to register the database.

6.18.3 How Oracle Database Uses the Listener (listener.ora)

Services coordinate their sessions using listener file entries by running a process on the server that receives connection requests on behalf of a client application. Listeners are configured to respond to connection requests sent to protocol addresses for a database service or nondatabase service.

Protocol addresses are configured in the listener configuration file, listener.ora, for a database service or a nondatabase service. Clients configured with the same addresses can connect to a service through the listener.

During a preconfigured database configuration installation, the Oracle Net Configuration Assistant creates and starts a default listener called LISTENER_NODENAME. The listener is configured with a default protocol listening addresses for the database and external procedures. The advanced installation process prompts you to create at least one listener with the Oracle Net Configuration Assistant. The listener is configured to respond to connection requests that are directed at one protocol address that you specify, as well as an address for external procedures.

Both installation modes configure service information about the RAC database and external procedures. A database service automatically registers its information with the listener, such as its service name, instance names, and load information. This feature, called service registration, does not require configuration in the listener.ora file. After listener creation, the Oracle Net Configuration Assistant
starts the listener. A sample listener.ora file with an entry for an instance named node1 is:

```ora
listener_node1=
(description=
(address=(protocol=ipc)(key=extproc))
(address=(protocol=tcp)(host=node1-vip)(port=1521))
(address=(protocol=tcp)(host=node1-ip)(port=1521)))
sid_list_listener_node1=
(sid_list=
(sid_desc=
(sid_name=plsextproc)
(oracle_home=/private/system/db)
(program=extproc)
```

### 6.18.3.1 Listener Registration and PMON Discovery

When a listener starts after the Oracle Database instance starts, and the listener is listed for service registration, registration does not occur until the next time the PMON discovery routine runs. By default, PMON discovery occurs every 60 seconds.

To override the 60-second delay, use the SQL `ALTER SYSTEM REGISTER` statement. This statement forces PMON to register the service immediately.

Oracle recommends that you create a script to process this statement immediately after starting the listener. If you run this statement while the listener is up and the instance is already registered, or while the listener is down, then the statement has no effect.

**See Also:** Oracle Database Net Services Administrator’s Guide (B10775-01) for more information about the listener and the listener.ora file

### 6.19 Directory Server Access (ldap.ora File)

If you configure access to a Lightweight Directory Access Protocol (LDAP)-compliant directory server with the Oracle Net Configuration Assistant during a Custom installation, then an ldap.ora file is created. The ldap.ora file contains the following types of information:

- Type of directory
- Location of the directory
- Administrative context from which this server can look up, create, and modify a net service name, and the database service entries

**See Also:** Oracle Database Net Services Administrator’s Guide (B10775-01) for more information about directory naming configuration and directory server access configuration

### 6.20 Net Service Names (tnsnames.ora File)

A tnsnames.ora file is created on each node with net service names. A connect identifier is an identifier that maps to a connect descriptor. A connect descriptor contains the following information:

- The network route to the service, including the location of the listener through a protocol address
- The SERVICE_NAME for an Oracle Database release 8.1 or later, or SID for pre-8.1 Oracle Database releases.

See Also: Oracle Database Net Services Administrator’s Guide (B10775-01) for more information about directory naming configuration and directory server access configuration
The DBCA creates net service names for connections as follows:

**Database Connections**

Clients that connect to any instance of the database use the net service name entry for the database. This entry also enables Oracle Enterprise Manager to discover a RAC database.

A listener address is configured for each node that runs an instance of the database. The `LOAD_BALANCE` option causes Oracle Database to choose the address randomly. If the chosen address fails, then the `FAILOVER` option causes the connection request to fail over to the next address. Therefore, if an instance fails, then clients can still connect using another instance.

In the following example, `db.us.oracle.com` is used by the client to connect to the target database, `db.us.oracle.com`.

```sql
db.us.acme.com=
(description=
 (load_balance=on)
 (address=(protocol=tcp)(host=node1-vip)(port=1521)
 (address=(protocol=tcp)(host=node2-vip)(port=1521)
 (connect_data=
   (service_name=db.us.acme.com)))
)
```

**Note:** The `SERVICE_NAME` parameter you use in `tnsnames.ora` is singular because you can only specify one service name.

When you set `DB_UNIQUE_NAME` by entering a global database name that is longer than eight characters, excluding `DB_DOMAIN`, then a net service entry similar to the following is created:

```sql
mydatabase.us.acme.com=
(description =
 (address = (protocol = tcp)(host = node1-vip)(port = 1521))
 (address = (protocol = tcp)(host = node2-vip)(port = 1521))
 (load_balance = yes)
 (connect_data =
   (server = dedicated)
   (service_name = mydatabase.us.acme.com)
 )
)
```

**Instance Connections**

Clients that connect to a particular instance of the database use the net service name entry for the instance. This entry, for example, enables Oracle Enterprise Manager to discover the instances in the cluster. These entries are also used to start and stop instances.

In the following example, `db1.us.acme.com`, is used by Oracle Enterprise Manager to connect to an instance named `db1` on `db1-server`:

```sql
db1.us.acme.com=
```
Net Service Names (tnsnames.ora File)

{description=
(address=[protocol=tcp](host=node1-vip)(port=1521))
(connect_data=
  {service_name=db.us.acme.com}
  {instance_name=db1}))

Remote Listeners
As discussed in Section 6.17, "Configuring Service Registration-Related Parameters in RAC", the REMOTE_LISTENER parameter identifies the global list of listeners and it is dynamic. Oracle Database changes the setting for REMOTE_LISTENER when you reconfigure the cluster database.

Whether using shared servers or dedicated servers, the list of remote listeners is supplied using the REMOTE_LISTENERS parameter, for example:

REMOTE_LISTENERS=listeners_db_unique_name

This enables the instance to register with remote listeners on the other nodes; listeners_db_unique_name is resolved through a naming method such as a tnsnames.ora file.

In the following example, listeners_db.us.acme.com is resolved to a list of listeners available on the nodes on which the cluster database has instances:

listeners_db.us.acme.com=
(address_list=
  (address=(protocol=tcp)(host=node1-vip)(port=1521))
  (address=(protocol=tcp)(host=node2-vip)(port=1521)))

The instance uses this list to determine the addresses of the remote listeners with which to register its information.

Nondefault Listeners
As discussed in Section 6.18.1, "Local Listeners" and Section 6.18.2, "Multiple Listeners", the LOCAL_LISTENER parameter is set in the init.sid.ora file if a nondefault listener is configured. For example:

sid.local_listener=listener_sid

Where listener_sid is resolved to a listener address through a naming method such as a tnsnames.ora file.

In the following example, listener_db1.us.acme.com is resolved to the nondefault listener address:

listener_db1.us.acme.com=
  (address=(protocol=tcp)(host=node1-vip)(port=1522))

Services Entries
When you configure high-availability services using the DBCA Services screen, then DBCA creates net service entries similar to the following. The three services in the following examples, db_svc1, db_svc2, and db_svc3, have TAF policies of NONE, BASIC and PRECONNECT, respectively.

db_svc1.us.acme.com=
  (description=
    (address=[protocol=tcp](host=node1-vip)(port=1521))
    (address=[protocol=tcp](host=node2-vip)(port=1521))
    (load_balance=yes)
    (connect_data=
      {server = dedicated}
(service_name = db_svc1.us.acme.com)
)
)

db_svc2.us.acme.com=
(description=
  (address=(protocol=tcp)(host=node1-vip)(port=1521))
  (address=(protocol=tcp)(host=node2-vip)(port=1521))
  (load_balance=yes)
  (connect_data =
    (server = dedicated)
    (service_name=db_svc2.us.acme.com)
    (failover_mode =
      (type=select)
      (method=basic)
      (retries=180)
      (delay=5)
    )
  )
)
)

db_svc3.us.acme.com=
(description=
  (address=(protocol=tcp)(host=node1-vip)(port=1521))
  (address=(protocol=tcp)(host=node2-vip)(port=1521))
  (load_balance=yes)
  (connect_data =
    (server=dedicated)
    (service_name=db_svc3.us.acme.com)
    (failover_mode= (backup=db_svc3_preconnect.us.acme.com)
      (type=select)
      (method=preconnect)
      (retries=180)
      (delay=5)
    )
  )
)
)

When a service has a TAF policy of PRECONNECT, then a service_name_preconnect net service entry is also created as in the following example:

db_svc3_preconnect.us.acme.com =
(description =
  (address = (protocol = tcp)(host = node1-vip)(port = 1521))
  (address = (protocol = tcp)(host = node2-vip)(port = 1521))
  (load_balance = yes)
  (connect_data =
    (server = dedicated)
    (service_name = db_svc3_preconnect.us.acme.com)
    (failover_mode =
      (backup = db_svc3.us.acme.com)
      (type = select)
      (method = basic)
      (retries = 180)
      (delay = 5)
    )
  )
)
)

**External Procedures**

An entry for connections to external procedures. This enables an Oracle Database to connect to external procedures.
Example 6–1  Example tnsnames.ora File

The following is a sample tnsnames.ora file that is created during a preconfigured database configuration installation:

```sql
extproc_connection_data.us.acme.com=
(description=
(address_list=
  (address=(protocol=ipc)(key=extproc0))
(connect_data=
  (sid=plsextproc)))

Example 6–1  Example tnsnames.ora File

The following is a sample tnsnames.ora file that is created during a preconfigured database configuration installation:

```db.us.acme.com=
(description=
  (load_balance=on)
  (address=(protocol=tcp)(host=node1-vip)(port=1521))
  (address=(protocol=tcp)(host=node2-vip)(port=1521))
  (connect_data=
    (service_name=db.us.acme.com)))

db1.us.acme.com=
(description=
  (address=(protocol=tcp)(host=node1-vip)(port=1521))
  (connect_data=
    (service_name=db.us.acme.com)
    (instance_name=db1)))

db2.us.acme.com=
(description=
  (address=(protocol=tcp)(host=node2-vip)(port=1521))
  (connect_data=
    (service_name=db.us.acme.com)
    (instance_name=db2)))

listeners_db.us.acme.com=
(address_list=
  (address=(protocol=tcp)(host=node1-vip)(port=1521))
  (address=(protocol=tcp)(host=node2-vip)(port=1521)))

extproc_connection_data.us.acme.com=
(description=
  (address_list=
    (address=(protocol=ipc)(key=extproc)))
  (connect_data=
    (sid=plsextproc)
    (presentation=RO)))

See Also:  Oracle Database Net Services Administrator’s Guide
(B10775-01) for more information about the tnsnames.ora file

6.21  Profile (sqlnet.ora File)

The sqlnet.ora file is automatically configured with:

- The computer domain
  
  This domain is automatically appended to any unqualified net service name. For example, if the default domain is set to us.acme.com, then Oracle Database resolves db in the connect string CONNECT scott/tiger@db as: db.us.acme.com.
A naming method the server uses to resolve a name to a connect descriptor

The order of naming methods is as follows: directory naming (for Custom installation only), tnsnames.ora file, Oracle Names server, and host naming.

The following is a sample sqlnet.ora file created during a preconfigured database configuration install:

names.default_domain=us.acme.com
names.directory_path={tnsnames, onames, hostname}

See Also: Oracle Database Net Services Administrator’s Guide (B10775-01) for more information about the sqlnet.ora file
Reviewing the Preconfigured Database

This chapter provides information about the default preconfigured database, including information about Oracle Database accounts, passwords, and file locations. The following topics are covered in this chapter:

- Section 7.1, "Reviewing Accounts and Passwords"
- Section 7.2, "Unlocking and Resetting User Passwords"
- Section 7.3, "Identifying Databases"
- Section 7.4, "Locating the Parameter Files"
- Section 7.5, "Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files"
- Section 7.6, "Adding or Upgrading Products"
- Section 7.7, "Relinking the Oracle Code"

7.1 Reviewing Accounts and Passwords

All databases that are created by DBCA include the SYS, SYSTEM, SYSMAN, and DBSNMP database accounts. In addition, Oracle provides several other administrative accounts. Before using these other accounts, you must unlock them and reset their passwords. Table 7–1 describes these accounts and lists their user names and default passwords.

<table>
<thead>
<tr>
<th>User Name</th>
<th>Default Password</th>
<th>Description</th>
<th>See Also</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANONYMOUS</td>
<td>ANONYMOUS</td>
<td>Enables HTTP access to Oracle XML DB.</td>
<td>None</td>
</tr>
<tr>
<td>BI</td>
<td>BI</td>
<td>Owns the Business Intelligence schema included in the Oracle Sample Schemas. It is available only if you loaded the Sample Schemas.</td>
<td>Oracle Database Sample Schemas (B10771-01)</td>
</tr>
<tr>
<td>CTXSYS</td>
<td>CTXSYS</td>
<td>Used for the Oracle Text account.</td>
<td>Oracle Text Reference (B10730-02)</td>
</tr>
<tr>
<td>DBSNMP</td>
<td>Password set during installation or in DBCA</td>
<td>Used by the Management Agent component of Oracle Enterprise Manager to monitor and manage the database. This account is created only if you configure the database to use the Grid Control.</td>
<td>Oracle Enterprise Manager Grid Control Installation and Basic Configuration (B12012-03)</td>
</tr>
</tbody>
</table>
Table 7–1 (Cont.) Database Accounts, Passwords, and Descriptions

<table>
<thead>
<tr>
<th>User Name</th>
<th>Default Password</th>
<th>Description</th>
<th>See Also</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIP</td>
<td>DIP</td>
<td>Used by the Directory Integration Platform (DIP) to synchronize the changes in Oracle Internet Directory with the applications in the database.</td>
<td>Oracle Internet Directory Administrator’s Guide</td>
</tr>
<tr>
<td>DMSYS</td>
<td>DMSYS</td>
<td>Used for data mining. The DMSYS account performs data mining operations.</td>
<td>Oracle Spatial User’s Guide and Reference (B10826-01)</td>
</tr>
<tr>
<td>EXFSYS</td>
<td>EXFSYS</td>
<td>Owns the Expression Filter schema.</td>
<td>None</td>
</tr>
<tr>
<td>HR</td>
<td>HR</td>
<td>Owns the Human Resources schema included in the Oracle Sample Schemas. It is available only if you load the Sample Schemas.</td>
<td>Oracle Database Sample Schemas (B10771-01)</td>
</tr>
<tr>
<td>IX</td>
<td>IX</td>
<td>Owns the Information Transport schema included in the Oracle Sample Schemas. This account is available only if you load the Sample Schemas.</td>
<td>Oracle Database Sample Schemas (B10771-01)</td>
</tr>
<tr>
<td>LBACSYS</td>
<td>LBACSYS</td>
<td>Is the Oracle Label Security administrator account.</td>
<td>Oracle Label Security Administrator’s Guide (B10774-01)</td>
</tr>
<tr>
<td>MDDATA</td>
<td>MDDATA</td>
<td>Used by Oracle Spatial for storing Geocoder and router data.</td>
<td>Oracle Spatial User’s Guide and Reference (B10826-01)</td>
</tr>
<tr>
<td>MDSYS</td>
<td>MDSYS</td>
<td>Is the Oracle Spatial and Oracle interMedia Locator administrator account.</td>
<td>Oracle Spatial User’s Guide and Reference (B10826-01)</td>
</tr>
<tr>
<td>ODM</td>
<td>ODM</td>
<td>Is the data mining account. ODM performs data mining operations.</td>
<td>Oracle Data Mining Administrator’s Guide (B10697-01) Oracle Data Mining Concepts (B10698-01)</td>
</tr>
<tr>
<td>ODM_MTR</td>
<td>MTRPW</td>
<td>Associated with the data repository for data mining sample programs.</td>
<td>Oracle Data Mining Administrator’s Guide (B10697-01) Oracle Data Mining Concepts (B10698-01)</td>
</tr>
<tr>
<td>OE</td>
<td>OE</td>
<td>Owns the Order Entry schema included in the Oracle Sample Schemas. This account is available only if you load the Sample Schemas.</td>
<td>Oracle Database Sample Schemas (B10771-01)</td>
</tr>
<tr>
<td>ORDPLUGINS</td>
<td>ORDPLUGINS</td>
<td>Is meant for the Oracle interMedia user. Plugins supplied by Oracle and third-party plugins are installed in this schema.</td>
<td>Oracle interMedia Reference (B10829-01)</td>
</tr>
<tr>
<td>ORDSYS</td>
<td>ORDSYS</td>
<td>Is the Oracle interMedia administrator account.</td>
<td>Oracle interMedia Reference (B10829-01)</td>
</tr>
</tbody>
</table>
Unlocking and Resetting User Passwords

Passwords for all Oracle system administration accounts except SYS, SYSTEM, SYSMAN, and DBSMP are revoked after installation. Before you use a locked account, you must unlock it and reset its password. If you created a preconfigured database during the installation, but you did not unlock a required account, then you must unlock it now, using one of the following methods:

- Section 7.2.1, "Using Grid Control to Unlock Accounts and Reset Passwords"
- Section 7.2.2, "Using SQL*Plus to Unlock Accounts and Reset Passwords"

Note: If you use DBCA to create a new database, you can unlock accounts after the database is created by clicking Password Management before you exit from DBCA.

### 7.2 Unlocking and Resetting User Passwords

**Table 7–1 (Cont.) Database Accounts, Passwords, and Descriptions**

<table>
<thead>
<tr>
<th>User Name</th>
<th>Default Password</th>
<th>Description</th>
<th>See Also</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTLN</td>
<td>OUTLN</td>
<td>Supports plan stability. Plan stability enables you to maintain the same execution plans for the same SQL statements. OUTLN acts as a role to centrally manage metadata associated with stored outlines.</td>
<td>Oracle Database Concepts (B10743-01)</td>
</tr>
<tr>
<td>PM</td>
<td>PM</td>
<td>Owns the Product Media schema included in the Oracle Sample Schemas. This account is created only if you load the Sample Schemas.</td>
<td>Oracle Database Sample Schemas (B10771-01)</td>
</tr>
<tr>
<td>SCOTT</td>
<td>TIGER</td>
<td>Used by Oracle sample programs and examples.</td>
<td>Oracle Database Administrator’s Guide (B10739-01)</td>
</tr>
<tr>
<td>SH</td>
<td>SH</td>
<td>Owns the Sales History schema included in the Oracle Sample Schemas. This account is available only if you load the Sample Schemas during an Enterprise Edition installation.</td>
<td>Oracle Database Administrator’s Guide (B10739-01)</td>
</tr>
<tr>
<td>SI_INFORMTN_SCHEMA</td>
<td>SI_INFORMTN_SCHEMA</td>
<td>Stores the information views for the SQL/MM Still Image Standard.</td>
<td>Oracle interMedia Reference (B10829-01)</td>
</tr>
<tr>
<td>SYS</td>
<td>Password set during installation or in DBCA.</td>
<td>Used to perform database administration tasks.</td>
<td>Oracle Database Administrator’s Guide (B10739-01)</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>Password set during installation or in DBCA.</td>
<td>Used to perform database administration tasks.</td>
<td>Oracle Database Administrator’s Guide (B10739-01)</td>
</tr>
</tbody>
</table>

---

### 7.2.1 Using Grid Control to Unlock Accounts and Reset Passwords

To unlock and reset user account passwords using Oracle Enterprise Manager Grid Control, perform the following steps:

1. Log on to the Grid Control.
2. Click Administration.
3. In the Security section of the Administration screen, click **Users**.

   Enterprise Manager displays a table listing all database accounts. The Account Status column indicates whether the account is locked and whether the password has expired.

4. Select the user account that you want to modify, then click **Edit**.

5. Use the General screen of the Users property sheet to unlock the account and (optionally) to change the password.

   **See Also:** Click **Help** in the Grid Control screen for more information about using the Grid Control.

### 7.2.2 Using SQL*Plus to Unlock Accounts and Reset Passwords

Perform the following steps to unlock and reset user account passwords manually:

1. Start SQL*Plus and log in as **SYSDBA**:

   ```
   $ sqlplus /nolog
   SQL> CONNECT SYS/SYS_password AS SYSDBA
   ```

2. Enter a command similar to the following, where `account` is the user account that you want to unlock and `password` is the new password:

   ```
   SQL> ALTER USER account [ IDENTIFIED BY password ] ACCOUNT UNLOCK
   ```

   In this example:

   - The **ACCOUNT UNLOCK** clause unlocks the account.
   - The **IDENTIFIED BY password** clause resets the password.

   **Note:** If you unlock an account but do not reset the password, then the password remains expired. The first time you connect as that user, you must change the user account password.

   To permit unauthenticated access to your data through HTTP, unlock the **ANONYMOUS** user account.

   **See Also:** *Oracle Database Administrator’s Guide* (B10739-01) for more information about:

   - Unlocking and changing passwords after installation
   - Oracle security procedures
   - Best security practices

### 7.3 Identifying Databases

Oracle Database software identifies a database by its global database name. A global database name consists of the database name and database domain. Usually, the database domain is the same as the network domain. However, it need not be the same. The global database name uniquely distinguishes a database from any other database in the same network. You specify the global database name when you create a database during the installation or by using DBCA. For example:

```
sales.us.acme.com
```
In this example:

- **sales** is the name of the database. The database name is a string of maximum eight characters that can contain alphanumeric, underscore (_), and pound (#) characters. The `DB_NAME` initialization parameter specifies the database name.

- **us.acme.com** is the network domain in which the database is located. The database name and the network domain together constitute the unique global database name. The domain is a string of maximum 128 characters that can contain alphanumeric, underscore (_), and pound (#) characters. The `DB_DOMAIN` initialization parameter specifies the domain name.

The `DB_NAME` and `DB_DOMAIN` parameters combine to create the global database name value. This value is assigned to the `SERVICE_NAMES` parameter in the initialization parameter file.

The system identifier (SID) identifies a specific database instance. The SID uniquely distinguishes the instance from any other instance on the same computer. Each database instance requires a unique SID and database name.

---

**Note:** The SID must contain no more than 6 characters on OpenVMS-based systems.

### 7.4 Locating the Parameter Files

The database initialization parameter file is generated when a database is created. By default, the preconfigured database uses a server parameter file named `spfile_sid.ora`. The following subsections describe the process of locating the parameter files:

- **Section 7.4.1, "Locating the init.ora File"**
- **Section 7.4.2, "Locating the Server Parameter File"**

#### 7.4.1 Locating the init.ora File

The database initialization parameter file (`init.ora`) is generated when a database is created. The `init.ora` file is used to start the database instance, and create the database and data dictionary. When the database creation is complete, the instance is shutdown, and the `init.ora` file is saved to `ora_root:[dbs]initSID.ora`. The logical, `ORA_PARAMS`, points to `ora_root:[dbs]initSID.ora`.

The `init.ora` file is a text file that contains a list of preconfigured instance configuration parameters that must exist for an instance to start. You do not need to edit this file to use the starter database.

**See Also:** *Oracle Database Administrator’s Guide* (B10739-01) and *Oracle Database Reference* (B10755-02) for more information about database-specific initialization parameters and their default values.

#### 7.4.2 Locating the Server Parameter File

By default, the preconfigured database uses a server parameter file named `spfile_sid.ora`, which is stored in the `ORA_ROOT:[dbs]` directory.

If the server parameter file is not located in this directory, then the database uses the `spfile` parameter in an initialization parameter file to locate it. The default file name and location of this initialization parameter file is `ORA_ROOT:[DBS]initsid.ora`. 

---

Reviewing the Preconfigured Database 7-5
You can use the Oracle Enterprise Manager to view the location of the server parameter file and list all the initialization parameters as follows:

1. Log on to the Enterprise Manager Control.
2. Under Targets tab, select the correct database target to display its home screen.
3. Click **Administration**.
4. In the Instance section of the Administration screen, click **All Initialization Parameters**.
   Enterprise Manager displays a table listing the current value of each initialization parameter.
5. Click **SPFile**.
   Enterprise Manager displays a table listing the value of each initialization parameter specified in the server parameter file. The location of the server parameter file is displayed above the table.

7.5 Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files

The following sections contain information about tablespaces and data files, redo log files, and control files:

- Section 7.5.1, "Identifying Tablespaces and Data Files"
- Section 7.5.2, "Locating Redo Log Files"
- Section 7.5.3, "Locating Control Files"

7.5.1 Identifying Tablespaces and Data Files

An Oracle Database is divided into smaller logical areas of space known as tablespaces. Each tablespace corresponds to one or more physical data files. Data files contain the contents of logical database structures such as tables and indexes. You can associate each data file with only one tablespace and database.

**Note:** The SYSAUX and SYSTEM tablespaces must be present in all Oracle Database 10g databases.

Table 7–2 describes the tablespaces that are provided by the default preconfigured database and a description of what they store.

<table>
<thead>
<tr>
<th>Tablespace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE</td>
<td>Stores the sample schemas if you install them</td>
</tr>
<tr>
<td>SYSAUX</td>
<td>Serves as an auxiliary tablespace to the SYSTEM tablespace. Some products and options that previously used the SYSTEM tablespace now use the SYSAUX tablespace, which reduces the load on the SYSTEM tablespace.</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>Stores the data dictionary, which includes definitions of tables, views, and stored procedures needed by Oracle Database.</td>
</tr>
</tbody>
</table>
Reviewing Tablespaces and Data Files, Redo Log Files, and Control Files

To use the Oracle Enterprise Manager Grid Control to view the list of data files that are used by the database and their associated tablespaces:

1. Log on to the Enterprise Manager Control.
2. Under Targets tab, select the correct database target to display its home screen.
3. Click Administration.
4. In the Storage section of the Administration screen, click Datafiles.

Enterprise Manager displays a table listing each data file and the tablespace with which it is associated.

7.5.2 Locating Redo Log Files

The starter database and the custom database each contain three redo log files that are located in the $ora_root:[oradata.db_name]$ directory. The preconfigured database uses three redo log files. These files record all the changes made to data in the database buffer cache. If an instance fails, then Oracle Database uses the redo log files to recover the modified data in memory.

Oracle Database uses redo log files in a cyclical fashion. For example, if three files constitute the online redo log, Oracle Database fills the first file, then the second file, and then the third file. In the next cycle, it reuses and fills the first file, the second file, and so on.

To use the Oracle Enterprise Manager Database Control to view or modify the redo log files for the preconfigured database, perform the following steps:

1. Log on to the Enterprise Manager Control.
2. Under the Targets tab, select the correct database target to display its home screen.
3. Click Administration.
4. In the Storage section of the Administration screen, click Redo Log Groups.

Oracle Enterprise Manager displays a table listing the redo log groups that are used by the database.
5. To view the name and location of the redo log file associated with a particular group, select that group and then click View.

### 7.5.3 Locating Control Files

A control file is an administrative file. Oracle Database requires a control file to start and run the database. A control file defines the physical structure of the database. For example, it defines the database name and the names and locations of the data files and redo log files.

The starter database contains three control files. These files are located in the \( \text{ora_root: [oradata.\_db_name]} \) directory. The \( \text{control01.ctl, control02.ctl, and control03.ctl} \) files are automatically included in the custom database. A preconfigured database uses three control files. Oracle recommends that you keep at least three control files (on separate physical drives) for each database and set the \( \text{CONTROL\_FILES} \) initialization parameter to list each control file.

To use the Oracle Enterprise Manager Grid Control to view information about the control files for the preconfigured database, perform the following steps:

1. Log on to the Enterprise Manager Control.
2. Under Targets tab, select the correct database target to display its home screen.
3. Click Administration.
4. In the Storage section of the Administration screen, click Control files.

Enterprise Manager displays a table listing the control files used by the database.

### 7.6 Adding or Upgrading Products

The following section describe the steps to add or upgrade Oracle products:

- Section 7.6.1, "Preparing to Add a Product"
- Section 7.6.2, "Adding a Product Summary"

#### 7.6.1 Preparing to Add a Product

Perform the following steps before you add or upgrade a product:

1. Verify that the system has Oracle Database installed.
2. Log on to your computer.
3. Run the following ORAUSER file for the database:
   
   $ set default ORACLE_HOME
   $ @orauser sid

4. If you plan to upgrade any Oracle product tables, then change the Oracle SYSTEM password to MANAGER.

---

**Note:** If you do not change the Oracle SYSTEM password to MANAGER, then the installation may fail. Oracle installation scripts often assume that the password is MANAGER. Alternatively, you can check for hard-coded user names and passwords in Oracle scripts and change them to the required user names and passwords.
5. Back up the old code and database files (data, redo log, and control).
6. Mount the distribution media.
7. Run Oracle Universal Installer, and select Custom install.
   After completing these preliminary steps, you can load and configure Oracle products.

### 7.6.2 Adding a Product Summary

To add a product summary:

1. Start Oracle Universal Installer as follows:
   ```bash
   $ @ora_root:[oui.bin]runinstaller.com
   ```
2. Point to the existing Oracle home.
3. Select Custom Install.
4. Select Products to Install.
5. Configure the products if Oracle Universal Installer asks for any specifications.
6. Click Install.
7. Exit Oracle Universal Installer.
8. Start an instance.
9. Build or upgrade the database tables menu.

### 7.7 Relinking the Oracle Code

The Oracle code must be relinked under the following conditions:

- Change of operating system (including an upgrade)
- Changes made to Oracle Net Services configuration
- Changes made to RDBMS configuration

The following sections describe how you can relink Oracle code.

#### Step 1 Shutting Down the Given Database(s)

Verify that you point to the right database instance. To do this, enter the following at the DCL prompt:

```bash
$ SHOW LOGICAL ORA_SID
ORA_SID' = 'V10g' (LNM$JOB_TABLE)
```

Start SQLPlus and connect to SYS. Select V$PROCESS from the view. If no other processes are active, and if you are pointing to the correct instance, then shut down the given database.

Oracle background processes stop after the database is shut down. To verify this, enter the `SHOW SYSTEM` command at the DCL prompt.

#### Step 2 Removing Images

To remove images, enter the following command at the system prompt:

```bash
$ REMORACLE
```
Step 3 Relinking the Oracle Code

To relink the Oracle code, enter the following command at the DCL prompt:

```
$ @ora_root:[bin]relink product / all
```
This chapter describes how to completely remove all Oracle Databases, their instances, and related software from an Oracle home directory. It includes information about the following topics:

- Section 8.1, "Identifying All Instances"
- Section 8.2, "Removing an Oracle Database"
- Section 8.3, "Reconfiguring Oracle Cluster Synchronization Services"
- Section 8.4, "Removing Oracle Software"

### 8.1 Identifying All Instances

To identify all instances associated with the Oracle home that you want to remove, enter the following command:

```
$ type sys$login:[hostname]oratab
```

### 8.2 Removing an Oracle Database

To completely remove Oracle Database software, you must remove any installed databases. To remove an Oracle Database:

#### Caution - Potential Loss of Data: Removing an Oracle Database deletes all of the data in the database. If you want to keep this data, then ensure that you back up the database before deleting it.

1. Log in as the `oracle` user.
2. Enter the following command to change the directory to the default database location:

   ```
   set default Oracle_home
   ```
3. At the prompt, specify the SID for the database that you want to remove:
   
   $ @orauser sid

4. Start the Database Configuration Assistant (DBCA) by using the following command:
   
   $ @dbca

   The Welcome screen is displayed.

5. Click Next.

   The Operations screen is displayed.

6. Select Delete a Database, then click Next.

7. Select the database that you want to delete, and then click Finish.

8. In the screen that is displayed, confirm that you want to delete the database.

9. When DBCA removes the database, you are prompted to select whether you want to perform another operation. Click Yes to return to the Operations screen or click No to exit from DBCA. If you want to remove another database, click Yes and repeat Steps 6 through 8.

8.3 Reconfiguring Oracle Cluster Synchronization Services

On cluster systems with Oracle Real Application Clusters (RAC) installations, the Cluster Synchronization Services (CSS) daemon is configured during the Oracle Cluster Ready Services (CRS) installation. If the system is running Oracle Cluster Ready Services (CRS), then refer to Oracle Real Application Clusters Installation and Configuration Guide (B10766-08) for information about removing RAC or CRS.

Before you remove an Oracle Database 10g Oracle home, you must determine whether the CSS daemon is running from that Oracle home and whether any other Oracle Database 10g Oracle homes exist on the system:

- If the Oracle Database 10g Oracle home that you want to remove is the only Oracle Database 10g installation on the system, then you can delete the CSS daemon configuration.

- If the CSS daemon is running from the Oracle Database 10g Oracle home that you want to remove, and if other Oracle Database 10g installations exist on the system, then you must reconfigure the CSS daemon to run from another Oracle Database 10g Oracle home.

The following subsections describe how to complete these tasks:

- Section 8.3.1, "Identifying Oracle Database 10g Oracle Homes"
- Section 8.3.2, "Reconfiguring the Oracle CSS Daemon"
- Section 8.3.3, "Deleting the Oracle CSS Daemon Configuration"

8.3.1 Identifying Oracle Database 10g Oracle Homes

Search the oratab file by using the following command:

$ type oratab
From the output, identify any Oracle home directories where Oracle Database 10g is installed. Oracle homes that contain Oracle Database 10g typically have paths similar to the following. However, they may use different paths.

```
/disk/oracle/db1010
```

If there is only one Oracle home directory that contains Oracle Database 10g, refer to Section 8.3.3, "Deleting the Oracle CSS Daemon Configuration" for information about deleting the Oracle CSS daemon configuration.

If you identify more than one Oracle Database 10g Oracle home directory, refer to the following section for information about reconfiguring the Oracle CSS daemon.

### 8.3.2 Reconfiguring the Oracle CSS Daemon

To reconfigure the Oracle CSS daemon so that it runs from an Oracle home that you are not removing:

1. Enter the following command to identify the Oracle home directory being used to run the CSS daemon:

   ```
   $ type DISK:[MYLOGIN.vmshost.oracle]ocr.loc
   ```

   The output from this command is similar to the following:

   ```
   $ type DISK:[MYLOGIN.vmshost.oracle]ocr.loc
   ocrconfig_loc= VMSDEVICE:[ANY_VMS_DIR]ocr.dat
   local_only=FALSE
   ```

   The `ocrconfig_loc` parameter specifies the location of the Oracle Cluster Registry (OCR) used by the CSS daemon. The path is the Oracle home directory where the CSS daemon is running.

   **Note:** If the value for the `local_only` parameter is `FALSE`, Oracle CRS is installed on this system. Refer to Oracle Real Application Clusters Installation and Configuration Guide (B10766-08) for information about removing RAC or CRS.

   If this Oracle home directory is not the Oracle home that you want to remove, you can continue to Section 8.4, "Removing Oracle Software".

2. Navigate to the Oracle home directory for an Oracle Database 10g installation that you are not removing.

3. Run the following command in this new Oracle home:

   ```
   $ @orauser
   ```

4. Enter the following command to reconfigure the CSS daemon to run from this Oracle home:

   ```
   $ @ora_root:[bin]localconfig 'reset' ORACLE_HOME
   ```

   The script stops the Oracle CSS daemon, reconfigures it in the new Oracle home, and then restarts it. When the system starts, the CSS daemon starts automatically from the new Oracle home.

### 8.3.3 Deleting the Oracle CSS Daemon Configuration

To delete the Oracle CSS daemon configuration:
1. Navigate to the Oracle home directory that you are removing.

2. Run the following command in the Oracle home:
   
   `$ @orauser`

3. Enter the following command to delete the CSS daemon configuration from this Oracle home:
   
   `$ @ora_root:[bin]localconfig delete`

   The script stops the Oracle CSS daemon, then deletes its configuration. When the system restarts, the CSS daemon does not start.

   **Note:** Delete the CSS daemon configuration only if you are certain that no other Oracle Database 10g installation requires it.

### 8.4 Removing Oracle Software

The following steps describe how to use the Installer to remove Oracle software from an Oracle home:

1. Remove any database instances that are associated with this Oracle home, and delete or reconfigure the Oracle CSS daemon.

2. Stop any processes running in this Oracle home:

   **Table 8–1 Commands to Stop Processes Running in Oracle Home**

<table>
<thead>
<tr>
<th>Process Name</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Net Services listener</td>
<td>lsnrctl stop</td>
</tr>
</tbody>
</table>

3. If necessary, log in as the `oracle` user.

4. Run the `orauser.com` file to redefine the Oracle home.
   
   `$ @orauser`

5. Start Oracle Universal Installer as follows:
   
   `$ @ora_root:[oui.bin]runinstaller.com`

6. In the Welcome screen, click **Deinstall Products**.

   The Inventory screen is displayed, listing all of the Oracle homes on the system.

7. In the Inventory screen, select the Oracle home and the products that you want to remove, then click **Remove**.

   **Caution:** If you select to remove Oracle JVM, then Oracle Universal Installer removes all installed products that depend on Oracle JVM, including Oracle Database.

8. When Oracle Universal Installer displays a confirmation screen asking you to confirm that you want to uninstall the products and their dependent components, click **Yes**.

   The Installer displays a progress indicator as it removes the software.
9. When the products have been deleted, click **Cancel** to exit from Oracle Universal Installer, then click **Yes**.

**Note:** Always use Oracle Universal Installer to remove Oracle software. Do not delete any Oracle home directories without first using Oracle Universal Installer to remove the software.
This appendix introduces the 64-bit feature or Very Large Memory (VLM) and recommends the parameter settings for this feature.

The topics covered in this appendix are:

- Section A.1, "Introduction to Oracle Database 64-Bit Feature"
- Section A.2, "Suggested Parameter Settings"
- Section A.3, "Other Recommendations"

**Attention:** The 64-bit feature is a standard feature of Oracle Database for OpenVMS and cannot be removed. The 64-bit feature tuning is under constant revision. Therefore, this information will be updated as further tuning suggestions are realized.

### A.1 Introduction to Oracle Database 64-Bit Feature

The Oracle 64-bit feature provides the ability to support Very Large Memory (VLM) system configurations with large amounts of RAM.

The following sections describe the benefits of the 64-bit feature and its implementation.

- Section A.1.1, "Benefits of Oracle Database 64-Bit Feature"
- Section A.1.2, "Implementation of Oracle 64-Bit Feature"

### A.1.1 Benefits of Oracle Database 64-Bit Feature

The primary benefit of the 64-bit feature is performance, because many operations can now run at memory speed instead of disk speed. With larger amounts of data in
the memory, the database issues fewer calls to disk. This greatly reduces the delay of disk I/O.

Oracle Database 64-bit feature also provides the advantage of scalability to support more users and larger volumes of data. The system does not need to swap data in and out of memory to process all the transaction requests, and it can effectively accommodate requests for large amounts of data.

The 64-bit feature benefits both query-intensive decision support system (DSS) and read/write (OLTP) transactions. The 64-bit feature provides index builds, full table scans, ad hoc queries, and multiway joins for DSS. For OLTP, the feature provides the ability to support very large tables, large amounts of data, and large number of users.

A.1.2 Implementation of Oracle 64-Bit Feature

The OpenVMS operating system has native 64-bit memory addressing, which enables Oracle Database to implement the 64-bit feature. The need to estimate the maximum System Global Area (SGA) at installation time is now eliminated. This speeds up process startup. The server no longer includes an SGA PAD.

By default, SGA creation uses the support, which was first used in OpenVMS version 7.1, that enables the creation of global sections. These global sections are not pageable and do not require a backing file.

A.2 Suggested Parameter Settings

The recommended parameter settings for the Oracle 64-bit feature are:

1. Big Oracle Blocks (BOB) provide the ability to support larger I/O transfers between memory and disk. BOB complements large SGA configurations, because BOB enables the system to move data faster between memory and disk. With VLM configurations, system performance depends directly on the ability of the system to move database blocks into the SGA as efficiently as possible. Without the benefits of improved data transfer, performance can decline.

   For a pure DSS application, select a large value (such as 32 KB) for DB_BLOCK_SIZE. For an OLTP type of application, choose a lower value (such as, 2 KB or 4 KB). The larger the DB_BLOCK_SIZE, the more serious the impact on single-row lookups.

2. Configure the size of the Oracle buffer cache such that it provides the best possible cache hit ratio without affecting memory requirements of other Oracle and system processes.

   For example, for a 3 GB buffer cache with DB_BLOCK_SIZE=8192, set DB_BLOCK_BUFFERS=400000.

3. To enable Cost-Based Optimizer (CBO), set the parameter setting as follows:
   
   optimizer_mode = choose

   To use CBO, ensure that all tables and indexes are analyzed such that the latest statistics are available. Use the SQL*Plus commands, analyze ...estimate for large tables and analyze index ... compute statistics for indexes.

---

Note: The Rule-based Optimizer (RBO) is used when statistics are not available.
4. Set the `SORT_AREA_SIZE` parameter with care. `SORT_AREA_SIZE` is the space used in Program Global Area (PGA) for each sort run by each Oracle process. If the value is too high, then the PGA will use excessive memory when sorting. The default value of 512 KB is usually sufficient.

Check statistics, such as `V$SYSSTAT`, to see if the number of sorts to disk is high compared to in-memory sorts. If it is, then increase the value of `SORT_AREA_SIZE`.

A.3 Other Recommendations

Check the size of the number of rows of the tables involved in the query, and translate this size into the total number of blocks. Based on the query, try to fit as many of the frequently accessed table blocks in the buffer cache.

For example, if four tables are involved in a query, but columns from one table are used repeatedly in the `WHERE` clause in joins, `IN`, and so forth, then try to fit as many blocks as possible from this table into the cache to see if `DB_BLOCK_BUFFERS` can be increased. To ensure that the frequently accessed tables are cached and stay in the most recently used (MRU) end of the cache, perform either of the following steps:

- Enter the following command (using SQL*Plus):

  ```sql
  alter table tablename cache
  ```

  or

- At the time of table creation, enter the following:

  ```sql
  create table tablename ... cache
  ```

If an adequate number of buffers are available to accommodate all blocks from all tables that are involved in the query, then use the `alter` command to cache all the blocks. The purpose is to cache most blocks into memory to ensure that I/O to disks is eliminated or remains low.
This chapter describes how to install and configure Oracle products noninteractively using response files. It includes information about the following topics:

- Section B.1, "Silent Mode Installation"
- Section B.2, "Performing Silent Installation"
- Section B.3, "Running Oracle Universal Installer in Silent Mode or Suppressed Mode"
- Section B.4, "Running NetCA in Silent Mode"
- Section B.5, "Running DBCA in Noninteractive or Silent Mode"

### B.1 Silent Mode Installation

A silent installation with Oracle Universal Installer is noninteractive, meaning that it takes place without using the Java graphical user interface (GUI). Oracle Universal Installer gets its information from a text file that is specified at the command line by using the `-responseFile` argument instead of interactive GUI input and output. If the `-responseFile` flag is given, then the installation is assumed to be a silent mode type.

**Note:** Because the design of Oracle Universal Installer causes GUI classes to be loaded (but not displayed), a silent installation still requires an X connection.

A silent installation can also be performed in BATCH mode, as long as the process has established an X connection through the `SET DISPLAY` command.

This section discusses the following topics:

- Section B.1.1, "What Is a Response File?"
- Section B.1.2, "Why Perform a Silent Installation?"
- Section B.1.3, "Modifying a Response File"

#### B.1.1 What Is a Response File?

A response file contains answers to installation questions that otherwise would be provided by the user in an interactive installation session. Each answer is stored as a value for a variable that is identified in the response file. For example, values for `ORACLE_HOME` or `Install Type` can be set automatically within the response file. Response file templates are generated by the installation developer. The response file
template for the installation of the product can be found on the ship set (CD-ROM number 1) under the device:[Disk1.response] directory. You should be able to find one for your choice of install type (for example, enterprise.rsp for an Enterprise Edition server installation, or custom.rsp for a custom installation).

**B.1.2 Why Perform a Silent Installation?**

Silent installations can be useful if you need to install an Oracle product multiple times on multiple computers, or if you prefer not to use the GUI because of performance reasons over a slow remote X connection. If the options that you select while installing on each computer are always the same, then you save the time of reviewing each installation screen and selecting the various installation options.

Silent installations can also ensure that multiple users in your organization use the same installation options when they install Oracle products. You can therefore more easily support those users because you already know what components and options have been installed on each computer.

Before you perform a silent installation, you should review the settings in the response file template that is provided with the Oracle product.

**B.1.3 Modifying a Response File**

If the product installation includes a response file template, then you can find it on the ship set (CD-ROM) in the device:[Disk1.response] directory. For a list of response files, refer to Section B.1.3.1, "List of Response File Names". Mandatory items have the following comment just before the definition:

`# OPENVMS_VALUE_REQUIRED`

Three values must be provided:

- **FROM_LOCATION**
- **ORACLE_HOME**
- **ORACLE_HOME_NAME**

FROM_LOCATION is the complete path of the source of the products to be installed (in other words, to the [.Disk1.stage]products.xml file) from CD-ROM number 1. If contents of CDs were copied to a local device, then specify that path. ORACLE_HOME is the directory into which the Oracle software will be installed. The account from which Oracle Universal Installer is run must have appropriate privileges to create a root-level directory if the directory that was specified for ORACLE_HOME does not already exist.

**Note:**

- **FROM_LOCATION** must be in UNIX-style syntax.
- **ORACLE_HOME** must be on an ODS-5 disk

To modify the response file:

1. Make a copy of the response file for the product, and open it in a text editor.
2. Search for the three items that are listed in the preceding paragraph (or for the string OPENVMS_VALUE_REQUIRED), and provide values for those items.
3. Modify other fields as applicable (refer to comments within the response file that you are modifying).
B.1.3.1 List of Response File Names

The following table lists the response file names and their descriptions:

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enterprise.rsp</td>
<td>Enterprise Edition Installation of Oracle Database Server</td>
</tr>
<tr>
<td>custom.rsp</td>
<td>Custom Edition Installation of Oracle Database Server</td>
</tr>
<tr>
<td>clientadmin.rsp</td>
<td>Administrator installation of Oracle Database Client</td>
</tr>
<tr>
<td>clientruntime.rsp</td>
<td>Run time installation of Oracle Database Client</td>
</tr>
<tr>
<td>clientcustom.rsp</td>
<td>Custom installation of Oracle Database Client</td>
</tr>
<tr>
<td>dbca.rsp</td>
<td>Database Configuration Assistant</td>
</tr>
</tbody>
</table>

B.2 Performing Silent Installation

You can install Oracle software noninteractively by specifying a response file when you start Oracle Universal Installer. The 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 Oracle Universal Installer prompts in the response file, then you can run a completely noninteractive installation.

To install and configure Oracle products noninteractively, complete the following steps:

- Section B.2.1, "Creating the oraInst.loc File"
- Section B.2.2, "Preparing Response Files"
- Section B.2.3, "Running Oracle Universal Installer Noninteractively"

These steps are described in the following sections.

B.2.1 Creating the oraInst.loc File

If you plan to install Oracle products noninteractively, then 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 that are installed on the system.

**Note:** If Oracle software has been installed previously on the system, then the `oraInst.loc` file may already exist. If the file does exist, then you do not need to create a new file.

To create the `oraInst.loc` file, perform the following steps:

1. Set default directory to the Oracle `oraInventory` directory.
   ```
   set def disk:[oraInventory_dir]
   ```
2. Use a text editor to create the `oraInst.loc` file, containing the following lines:
   ```
   inventory_loc=oraInventory_location
   inst_group=group_id
   ```
   In this example, `oraInventory_location` is the location of the Oracle Inventory directory, and `group_id` is the group ID of the Oracle OpenVMS account.
3. Set the file protection on the `oraInst.loc` file as follows:
B.2.2 Preparing Response Files

Oracle provides response file templates for each product and installation type and for each configuration tool. These files are located in the `response` directory on the CD-ROM or the `.[db].response` directory on the DVD.

**Note:** If you copy the software to a hard disk, then the response files are located in the `.[Disk1].response` directory.

Table B–1 lists the response files that are provided with Oracle Database 10g.

<table>
<thead>
<tr>
<th>Response File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enterprise.rsp</td>
<td>Enterprise Edition installation of Oracle Database</td>
</tr>
<tr>
<td>custom.rsp</td>
<td>Custom installation of Oracle Database</td>
</tr>
<tr>
<td>dbca.rsp</td>
<td>Database Configuration Assistant</td>
</tr>
<tr>
<td>netca.rsp</td>
<td>Oracle Net Services Configuration Assistant</td>
</tr>
</tbody>
</table>

To prepare a response file:

1. Copy the response file from the response file directory to a directory on the system:

   ```shell
   $ copy [src_path]response_file dest_path
   ```

   In this example, `src_path` is the CD-ROM mount point directory or the `db` directory on the DVD. If you have copied the software to a hard drive, then you can edit the file in the `response` directory if you prefer.

2. Open the response file in a text editor:

   ```shell
   $ ed [dest_path]response_file
   ```

3. Edit the file by following the instructions in the file.

   **Note:** Oracle Universal Installer or the configuration assistant fails if you do not correctly configure the response file. Refer to Section G.6, "Silent Response File Error Handling" for more information about troubleshooting a failed noninteractive installation.

B.2.3 Running Oracle Universal Installer Noninteractively

To run Oracle Universal Installer noninteractively, enter a command similar to the following:

```shell
$ [directory_path]runInstaller [-silent] -responseFile filename
```

In this command:

- `directory_path` is either the disc directory path, or the path of the `Disk1` directory on the hard drive
-silent specifies a completely noninteractive installation
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, then Oracle Universal Installer stops.

B.3 Running Oracle Universal Installer in Silent Mode or Suppressed Mode

To run Oracle Universal Installer in silent mode or suppressed mode, use the following steps:

1. Complete the preinstallation tasks listed in Chapter 2, "Preinstallation Tasks".
2. Log in as the Oracle software owner user (typically, oracle).
3. If you are performing a suppressed-mode installation, set the DISPLAY.

Note: You do not need to set the DISPLAY if you are performing a silent-mode installation (as opposed to a suppressed-mode installation).

4. To start Oracle Universal Installer in silent mode or suppressed mode, enter a command similar to the following command:

   $ [directory_path]runInstaller [-silent] -responseFile filename

   In the example:
   - directory_path is either the CD-ROM directory, the path of the db 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.
   - 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, then Oracle Universal Installer fails.

B.4 Running NetCA in Silent Mode

You can run Network Configuration Assistant (NetCA) in silent mode to configure and start an Oracle Net Services listener on the system, to configure naming methods, and to configure Oracle Net Services service names. To run NetCA in silent mode, you must copy and edit a response file template. Oracle provides a response file template
Running DBCA in Noninteractive or Silent Mode

Note: If you copied the software to a hard disk, then the response file template is located in the [.Disk1.response] directory.

To run NetCA in silent mode, perform the following steps:

1. Copy the netca.rsp response file template from the response file directory to a directory on the system.
   
   ```
   $ copy [directory_path.response]netca.rsp local_directory
   ```
   
   In this example, `directory_path` is the CD-ROM mount point directory or the db directory on the DVD. If you have copied the software to a hard drive, then you can edit the file in the response directory if you prefer.

2. Open the response file in a text editor. For example:
   
   ```
   $ ed [logical_directory]netca.rsp
   ```

3. Edit the file by following the instructions in the file.

   Note: NetCA stops if you do not correctly configure the response file.

4. Log in as the Oracle software owner (typically oracle) and set the ORACLE_HOME logical to specify the correct Oracle home directory.

5. Enter a command similar to the following to run NetCA in silent mode:
   
   ```
   $ @ORA_ROOT:[bin]netca /silent /responsefile=/local_dir/netca.rsp
   ```

   In this example:
   - `/silent` option indicates that you want to run NetCA in silent mode.
   - `local_dir` is the full path of the directory where you copied the netca.rsp response file template.

B.5 Running DBCA in Noninteractive or Silent Mode

You can run Database Configuration Assistant (DBCA) in noninteractive or silent mode to configure and start Oracle Database on the system. To run DBCA in noninteractive or silent mode, you must copy and edit a response file template. Oracle provides a response file template named dbca.resp in the response directory on the CD-ROM or in the [.db.response] directory on the DVD.

Note: If you copy the software to a hard disk, then the response file template is located in the [.Disk1.response] directory.

Silent mode or noninteractive mode requires an appropriate response file. The following sections discuss how to use and run DBCA in silent mode or noninteractive mode:

- Section B.5.1, "Using DBCA in Noninteractive Mode"
B.5.1 Using DBCA in Noninteractive Mode

In noninteractive mode, DBCA uses values that you specify in the response file or as command line options to create a database. As DBCA configures and starts the database, it displays a screen that contains status messages and a progress bar. The screen that it displays is the same screen that is displayed when you create a preconfigured database during an Enterprise Edition installation.

To run DBCA in noninteractive mode, you must use a graphical display and set the DISPLAY.

B.5.2 Using DBCA in Silent Mode

In silent mode, DBCA uses values that you specify in the response file or as command-line options to create a database. DBCA does not display any screens or information while it creates the database. It logs all messages (including information, errors, and warnings) in a log file.

From the command line, enter the following command to see all of the DBCA options that are available when you use the silent mode:

```bash
$ @ora_root:[bin]dbca.com -help
```

B.5.3 Running DBCA in Noninteractive or Silent Mode

To run DBCA in noninteractive or silent mode, use the following steps:

---

**Note:** As an alternative to editing the response file template, you can also create a database by specifying all required information as command-line options when you run DBCA. For information about the supported options, enter the following command:

```bash
$ @ORA_ROOT:[bin]dbca
```

Because of the DCL limit of eight command-line parameters on OpenVMS, it is not possible to specify all the required parameters to create a database directly at the command line. Therefore, as a workaround, DBCA command-line arguments may be placed in a file called `SYS$SCRATCH:DBCA.ARGS`. The `dbca.com` script looks for this file, and if present, passes the specified arguments to the DBCA Java application. The `dbca.com` script ignores all arguments that are specified at the command line except `-silent`, `-responseFile response_file`, and `-help`. To avoid inadvertently applying the same arguments to the next invocation of DBCA when `DBCA.ARGS` exits, if an arguments file was used, then it is renamed to `SYS$SCRATCH:DBCA.ARGS_OLD`.

---

**Note:** Because the DBCA design causes GUI classes to be loaded (even in silent mode), a silent installation requires an X connection.
1. Copy the `dbca.rsp` response file template from the response file directory to a directory on the system:

   ```
   $ copy [src_path]dbca.rsp dest_path
   ```

   In this example, `src_path` is the CD-ROM directory or the `db` directory on the DVD. If you have copied the software to a hard drive, then you can edit the file in the `response` directory if you prefer.

2. Open the response file in a text editor as follows:

   ```
   $ ed netca.rsp
   ```

3. Edit the file by following the instructions in the file.

   **Note:** DBCA stops if you do not correctly configure the response file.

4. Log in as the Oracle software owner user (typically `oracle`) and set the `ORACLE_HOME` logical to specify the correct Oracle home directory.

5. If you intend to run DBCA in noninteractive mode, then set the `DISPLAY`.

6. Enter a command similar to the following to run DBCA in noninteractive or silent mode with a response file:

   ```
   $ @ORA_ROOT:[bin]dbca {-progressOnly | -silent} [-cloneTemplate] [-datafileDestination /datafilepath] -responseFile /local_dir/dbca.rsp
   ```

   In the example:
   - `-silent` indicates that you want to run DBCA in silent mode.
   - `-progressOnly` indicates that you want to run DBCA in noninteractive mode.
   - `-cloneTemplate` is required if you want to create one of the following preconfigured databases:
     - General Purpose
     - Transaction Processing
     - Data Warehouse
   - `-datafileDestination` specifies the parent directory where you want to create the database files. If you do not specify this option, then the parent directory for database files is the `ora_root:[oradata]` directory.
   - `local_dir` is the full path of the directory where you copied the `dbca.rsp` response file template.

The following sections contain examples that illustrate the use of silent mode.

**DBCA Silent Mode Example 1: Creating a Clone Database**

To create a clone database, enter the following in `SYS$SCRATCH:DBCA.ARGS`:

- `silent`
- `createDatabase`
- `templateName Transaction_Processing.dbc`
- `dbname oracle10`
- `sid oracle10`
- `datafileJarLocation /disk$disk1/oracle10g/ora10/assistants/dbca/templates`
- `datafileDestination /disk$disk1/oracle10g/ora10/oradata`
-responseFile NO_VALUE
-characterset WE8ISO8859P1

**Note:** Either OpenVMS-based arguments or UNIX-based arguments may be used in the arguments that are contained in an argument file.

Then, ensure that the ORACLE_HOME environment is set up by running:

```
$ @ORACLE_HOME/orauser
```

For example:

```
$ @Disk$disk1:[oracle10g.oral0]orauser
```

Next, start DBCA. Log files are located in the same place as with an interactive install. In this example:

```
Disk$disk1:[oracle10g.oral0.admin.oral0.create]
```

In addition, check the ORA_ROOT:[assistants.dbca.logs] directory.

**DBCA Silent Mode Example 2: Creating a Seed Template**

To create a seed template, enter the following in SYS$SCRATCH:DBCA.ARGS:

```
-silent
-createCloneTemplate
-sourceDB ora10
-sysDBAUserName sys
-sysDBAPassword change_on_install
-templateName copy_of_ora10
-datafileJarLocation /disk$disk1/oracle10g/ora10/assistants/dbca/templates
```

Then, ensure that the ORACLE_HOME environment is set up by running the orauser script, start DBCA. Log files for creating a seed template are located in the ORA_ROOT:[assistants.dbca.logs] directory.
This appendix describes how to install the gateway software from the distribution CD-ROM.

It contains the following topics:

- Section C.1, "System Requirements for Oracle Transparent Gateway"
- Section C.2, "Installing Oracle Transparent Gateway"
- Section C.3, "Removing Oracle Transparent Gateway"

C.1 System Requirements for Oracle Transparent Gateway

Oracle supports the software configurations that are described in this section if, and only if, the underlying system software products are supported by their respective vendors. Verify the latest support status with your system software vendors.

Review the system hardware and software to ensure that it meets requirements, and then determine gateway configuration before you install the gateway. Gateway components can be located on one platform or distributed over several platforms. These gateways are shipped on the server CD-ROM and are built with Oracle libraries. The operating system requirements for the gateways are therefore the same as that for Oracle Database.

Refer to Chapter 1, "Installation Overview" and Chapter 2, "Preinstallation Tasks" for the database requirements.

The requirements for Oracle Net Services working on the gateway computer are Oracle Net Services Server release 10.1.0.3.0. The requirements for Oracle Net Services working on Oracle Database server computer are Oracle Net Services Client release 10.1.0.3.0.
Use the installation worksheet that is provided for your configuration to ensure that you have all required information before beginning installation. The following sections describe system requirements for gateway configuration and provide worksheets to use during the installation:

- **Section C.1.1, "Rdb Gateway Requirements"**
- **Section C.1.2, "RMS Gateway Requirements"**
- **Section C.1.3, "Tested Gateway Configurations"**
- **Section C.1.4, "Gateway Installation Worksheets"**

### C.1.1 Rdb Gateway Requirements

Table C–1 describes the hardware and software requirements for an Rdb gateway. Use it to ensure that the system meets requirements to create a gateway for Rdb.

**Table C–1  Rdb Gateway Requirements**

<table>
<thead>
<tr>
<th>Hardware/Software</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>A Hewlett-Packard Alpha workstation running the required version of OpenVMS.</td>
</tr>
</tbody>
</table>
| Memory              | 26 MB of real memory is recommended to support the gateway. The total real memory requirement for the concurrent use of the gateway depends on the following factors:  
  - The SQL statement issued by the user.  
  - The number of cursors currently opened against Rdb.  
  - The number of columns in the table being accessed. |
| CD-ROM drive        | An internal or external CD-ROM drive.                                       |
| Disk space          | 200 MB                                                                      |
| Operating system    | OpenVMS 7.3-2                                                               |
| Operating system patch | Use the latest patch kit from Hewlett-Packard. Hewlett-Packard provides patch information at [http://www.hp.com/support](http://www.hp.com/support) |
Table C–2 describes the hardware and software requirements for an RMS gateway. Use it to ensure that the system meets requirements to create a gateway for the Oracle Transparent Gateway for RMS.

### Table C–2  RMS Gateway Requirements

<table>
<thead>
<tr>
<th>Hardware/Software</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Net Services Requirements</td>
<td>Oracle Net Services on OpenVMS is developed and certified using Hewlett-Packard TCP/IP Services for OpenVMS (UCX). If you wish to use the TCP/IP protocol adapter for Oracle Net Services, you should have version 5.4 ECO 1 or higher of TCP/IP Services for OpenVMS installed. TCP/IP protocol stacks from other vendors may work with Oracle, but customers use these products at their own risk. Any TCP/IP problems that cannot be reproduced using TCP/IP Services for OpenVMS will be referred to the TCP/IP vendor. Vendor-provided protocol services are usually upward-compatible, so that existing applications will continue to work without modification. Therefore, later releases of TCP/IP are upward-compatible with Oracle Net Services, as long as the vendor-specified application programming interface (API) does not change with new releases.</td>
</tr>
<tr>
<td>Oracle Database Server</td>
<td>Oracle Database Enterprise Edition server release 1 (10.1.0.3.0) Oracle Database server can reside on any supported platform.</td>
</tr>
</tbody>
</table>
| Oracle Net Services | On gateway computer:  
  - Oracle Net Services Server release 10.1.0.3.0  
  - Oracle Adapter for Named Pipes or TCP/IP  
  The following are required on Oracle Database server computer:  
  - Oracle Net Services Client release 10.1.0.3.0  
  - Oracle Adapter for Named Pipes or TCP/IP  
  Oracle Net Services products are included on the distribution CD-ROM.  
  Oracle Net Services or Oracle Net Services Client and the Oracle Adapter must be installed on the computer where Oracle Database server is installed. Oracle Net Services Server and the Oracle Adapter must be installed on the computer where the gateway is installed. |
| Rdb | Rdb release 7.1  
This is the latest release of Rdb. |

### C.1.2 RMS Gateway Requirements

Table C–2 describes the hardware and software requirements for an RMS gateway. Use it to ensure that the system meets requirements to create a gateway for the Oracle Transparent Gateway for RMS.
C.1.3 Tested Gateway Configurations

The following gateway configurations have been tested by Oracle at the time of this document release. Oracle continues to provide support for the most recent releases of Oracle and non-Oracle systems in a timely manner.

<table>
<thead>
<tr>
<th>Format</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rdb</td>
<td>tg4rdb release 7.1</td>
</tr>
<tr>
<td>RMS</td>
<td>tg4rms release 7.3-2</td>
</tr>
</tbody>
</table>
See Also: Oracle continually updates supported gateway configurations. For the latest supported configuration information, either contact Oracle Support Services or visit the following Web site:

http://www.oracle.com/gateways

C.1.4 Gateway Installation Worksheets

Select the worksheet in one of the following tables that is appropriate for the system. Use the values that you enter as a reference during the configuration process:

- Section C.1.4.1, "Rdb Gateway Worksheet"
- Section C.1.4.2, "RMS Gateway Worksheet"

C.1.4.1 Rdb Gateway Worksheet

Use Table C–3 to collate system information for an Rdb gateway configuration.

**Table C–3  Rdb Gateway Installation Worksheet**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Database server computer name</td>
<td></td>
</tr>
<tr>
<td>Oracle Database server platform (operating system and its version number)</td>
<td></td>
</tr>
<tr>
<td>Oracle home of Oracle Database (full path name)</td>
<td></td>
</tr>
<tr>
<td>Gateway computer name</td>
<td></td>
</tr>
<tr>
<td>Gateway computer platform (operating system and its version number)</td>
<td></td>
</tr>
<tr>
<td>Oracle home of the gateway (full path name)</td>
<td></td>
</tr>
<tr>
<td>Location of Rdb database to which the gateway will connect</td>
<td></td>
</tr>
</tbody>
</table>

C.1.4.2 RMS Gateway Worksheet

Use Table C–4 to record the system values for an RMS gateway configuration.

**Table C–4  RMS Gateway Installation Worksheet**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Database server computer name</td>
<td></td>
</tr>
<tr>
<td>Oracle Database server platform (operating system and its version number)</td>
<td></td>
</tr>
<tr>
<td>Oracle home of Oracle Database (full path name)</td>
<td></td>
</tr>
<tr>
<td>Gateway computer name</td>
<td></td>
</tr>
<tr>
<td>Gateway computer platform (operating system and its version number)</td>
<td></td>
</tr>
<tr>
<td>Oracle home of the gateway (full path name)</td>
<td></td>
</tr>
</tbody>
</table>

C.2 Installing Oracle Transparent Gateway

Use the following procedures and tables to install Oracle Transparent Gateway.

- Section C.2.2.1, "Installation Prompts for Rdb Gateway"
Removing Oracle Transparent Gateway

■ Section C.2.2.2, "Completing Rdb Gateway Installation"

C.2.1 Mounting Oracle Transparent Gateway from the CD-ROM or DVD

Install the gateway software from the CD-ROM or DVD as follows:

1. Start Oracle Universal Installer.

See Also: Chapter 3, "Installation Tasks" for information about starting Oracle Universal Installer

2. Install the gateway by responding to installation prompts as described in the following section.

C.2.2 Installation Prompts for Oracle Transparent Gateway

Select the installation prompt section that corresponds to the gateway that you wish to install.

■ Section C.2.2.1, "Installation Prompts for Rdb Gateway"

■ Section C.2.2.2, "Completing Rdb Gateway Installation"

C.2.2.1 Installation Prompts for Rdb Gateway

In the Response screen, enter the complete path for Rdb database in the Location of Rdb database.

Follow the instructions in the Response column for each entry in the Screen column. When you have completed the responses, follow the instructions in Section C.2.2.2, "Completing Rdb Gateway Installation".

C.2.2.2 Completing Rdb Gateway Installation

When the Summary screen is displayed, click Install.

Verify that the installation was successful after Oracle Universal Installer confirms that the installation has been completed. Check the contents of the installActions.log file located in the orainventory_location:[logs] directory.

Note: There are no installation prompts for the RMS gateway.

C.3 Removing Oracle Transparent Gateway

Remove the gateway as follows:

1. Start Oracle Universal Installer.

2. Click Deinstall Products on the Welcome screen or Installed Products ... that is available on any Oracle Universal Installer screen. The Inventory screen is displayed and displays a list of installed products.

3. Select the gateway product in the Inventory screen and click Remove.

Files copied into the ORACLE_HOME directory during the gateway installation are automatically removed. You must manually remove all other related files.
This appendix discusses troubleshooting and other considerations when using Real Application Clusters (RAC).

Topics covered in this appendix are:

- Section D.1, "Documentation Sources"
- Section D.2, "Troubleshooting the RAC Installation Process"
- Section D.3, "Preconversion Considerations"
- Section D.4, "Converting from Single-Instance to RAC"
- Section D.5, "Postconversion Steps"
- Section D.6, "OpenVMS Directory Structures for RAC"

D.1 Documentation Sources

The information in this Appendix is meant to supplement the detailed information you will find in Oracle Real Application Clusters Administrator’s Guide (B10765-02). Refer to this document as necessary when reading through this Appendix.

In addition, you will find important OpenVMS-specific installation and configuration information pertaining to Oracle Real Application Clusters in Chapter 5, "Installing RAC" and Chapter 6, "Configuring RAC".

See Also: For more information about configuring and using Oracle Real Application Clusters, refer to the Oracle Real Application Clusters Installation and Configuration Guide (B10766-08)
D.2 Troubleshooting the RAC Installation Process

The following sections contain troubleshooting information to assist you during the installation of Oracle Database 10g Real Application Clusters (RAC).

See Also: The Oracle Database 10g Real Application Clusters (RAC) documentation set that is included on the Oracle Database 10g Server Documentation CD consists of the following documents:

- Oracle Real Application Clusters Administration and Deployment Guide (B14197-01)
- Oracle Real Application Clusters Deployment and Performance Guide (B10768-02)

Oracle Real Application Clusters (RAC) Management Tools Error Messages are in Oracle Real Application Clusters Administration and Deployment Guide (B14197-01)

D.3 Preconversion Considerations

The following sections describe the considerations for converting from Oracle Database 10g single-instance databases to RAC databases.

- Section D.3.1, "Prerequisites for Conversion"
- Section D.3.2, "Administrative Considerations"

If you are upgrading from Oracle Parallel Server to RAC or from an earlier version of RAC, then follow the steps described in Section 1.7, "Upgrading from an Earlier Release of Oracle Database". It is assumed that the original single-instance database and the target RAC database are of the same version of Oracle Database 10g and running on the same platform.

D.3.1 Prerequisites for Conversion

The system that you are converting to RAC must meet the following hardware and software requirements:

- A supported hardware and operating system software configuration
- An additional license for Oracle Database 10g Enterprise Edition with RAC

D.3.2 Administrative Considerations

Note the following administrative considerations before conversion:

- Backup procedures should be available before converting from a single-instance Oracle Database to RAC.
- The archive file format requires a thread number. In addition, the archived logs from all instances of a RAC database are required for media recovery. You must ensure that the disks on which the archive logs are placed are accessible from all nodes on which the cluster database has instances.

D.4 Converting from Single-Instance to RAC

Oracle recommends that you use DBCA to convert from single-instance Oracle Databases to RAC. DBCA automates the configuration of the control file attributes,
creates the undo tablespaces and the redo logs, and makes the initialization parameter file entries for cluster-enabled environments. It also configures the Oracle Net Services and Cluster Ready Services (CRS) resources and performs the configuration for RAC database management for use by Oracle Enterprise Manager or by the SRVCTL utility. This section describes the following scenarios:

- Section D.4.1, "Single-Instance Database on a Noncluster Computer to RAC"
- Section D.4.2, "Single-Instance Database on a Cluster to Oracle Database 10g RAC"

D.4.1 Single-Instance Database on a Noncluster Computer to RAC

To convert from a single-instance Oracle Database that is on a noncluster computer to RAC, perform the following procedures in the order shown:

1. Section D.4.1.1, "Backing Up the Original Single-Instance Database"
2. Section D.4.1.2, "Performing the Preinstallation Steps"
3. Section D.4.1.3, "Setting Up the Cluster"
4. Section D.4.1.4, "Copying the Preconfigured Database Image"
5. Section D.4.1.5, "Installing Oracle Database 10g with RAC"

D.4.1.1 Backing Up the Original Single-Instance Database

Use DBCA to create a preconfigured image of the single-instance database. To do this, perform the following:

1. Start DBCA from the bin directory in ORACLE_HOME.
2. On the Welcome screen, select Manage Templates.
3. Select Create a database template.
4. Select the database name from Database Name.
5. Enter the template name and description and template data file location in Template Name. Use the database name as the default template name.
6. Click Finish.

DBCA generates two files, a database structure file (template_name.dbc) and a database preconfigured image file (template_name.dfb). These files are generated by default in the ORA_ROOT:[assistants.dbca.templates] directory.

D.4.1.2 Performing the Preinstallation Steps

Perform the preinstallation steps as documented in this book. Then, set up shared storage by referring to Section 2.13, "Creating Directories for Oracle Database or Recovery Files".

See Also: Vendor-specific documentation about storage for information about how to mirror and stripe disks

D.4.1.3 Setting Up the Cluster

If have not already done so, create a cluster with the required number of nodes according to the vendor documentation. Once you have configured all the nodes in the cluster, install CRS by following the procedure in Section 5.10, "Installing Cluster Ready Services on OpenVMS".
D.4.1.4 Copying the Preconfigured Database Image
This includes copying the database structure *.dbc file and the database preconfigured image *.dfb file to a temporary location on the node in the cluster from which you plan to run DBCA. These files are created by DBCA. For more information, refer to Section D.4.1.1, "Backing Up the Original Single-Instance Database".

D.4.1.5 Installing Oracle Database 10g with RAC
Perform the following tasks to install Oracle Database 10g with RAC:

1. Run Oracle Universal Installer.
2. Select Cluster Installation Mode on the Specify Hardware Cluster Installation screen, and select the nodes to include in the RAC database.
3. On the Database Configuration Types screen, select the Advanced install type.
   After installing the Oracle software, Oracle Universal Installer runs the postinstallation configuration tools, such as the Network Configuration Assistant (NetCA), DBCA, and so on.
4. On the DBCA Template Selection screen, use the template that you copied to a temporary location in the Section D.4.1.4, "Copying the Preconfigured Database Image" procedure. Use the browse option to select the template location.
5. After creating the RAC database, DBCA displays the Password Management screen. On this screen, change the passwords for the privileged users with the SYSDBA and SYSOPER roles. Once DBCA exits, the conversion process is complete.

D.4.2 Single-Instance Database on a Cluster to Oracle Database 10g RAC
There are three scenarios in which a single-instance database can exist on a cluster computer:

- The Oracle home from which the single-instance database is running is installed on a cluster (Oracle Database 10g with RAC).
- The Oracle home from which the single-instance database is running is installed on a cluster but the RAC feature is disabled.
- The Oracle home from which the single-instance database is running is not installed on a cluster.

Use the following procedures to convert the single-instance database on a cluster computer to RAC for all of these scenarios:

- Section D.4.2.1, "Single Instance on a Cluster Running from a Cluster-Enabled Oracle Home"
- Section D.4.2.2, "Automated Conversion"
- Section D.4.2.3, "Manual Conversion"
- Section D.4.2.4, "Single-Instance Database on a Cluster Running from a RAC-Disabled Oracle Home"
- Section D.4.2.5, "Single-Instance Database on a Cluster Running from a Noncluster-Installed Oracle Home"
D.4.2.1 Single Instance on a Cluster Running from a Cluster-Enabled Oracle Home

Perform the following tasks to convert a single-instance database on a cluster running from a cluster installed Oracle home.

1. Use DBCA to create a preconfigured image of the single-instance database as described in Section D.4.1.1, "Backing Up the Original Single-Instance Database". To perform the conversion manually, shut down the single-instance database.

2. To add nodes to the cluster, add and connect these nodes to the cluster as described in Section D.4.1.2, "Performing the Preinstallation Steps". Ensure that all these nodes can access the shared storage.

3. From one of the newly added nodes, configure the listeners on the additional nodes using the NetCA. Select the same port number and protocol that you used on the existing node. If the NetCA displays the existing node on the Node List screen, then do not select this node because the listener is already configured on it.

4. Convert the database using one of the following procedures:
   - Section D.4.2.2, "Automated Conversion"
   - Section D.4.2.3, "Manual Conversion"

D.4.2.2 Automated Conversion

The following steps describe the procedure to automatically convert the database:

1. If you created the preconfigured image of the single instance database as described in Section D.4.1.1, "Backing Up the Original Single-Instance Database", then use DBCA to complete the conversion to a RAC database.

2. Start DBCA from the initial node. Select the names of the nodes that you want to include as part of the cluster database. On the Template Selection screen, select the preconfigured template that you create in Step 1. Enter the database name and respond to the remaining DBCA prompts.

After creating the RAC database, DBCA displays the Password Management screen. Change the passwords for database privileged users who have SYSDBA and SYSOPER roles. Once DBCA exits, the conversion process is complete.

D.4.2.3 Manual Conversion

Perform the following steps to manually convert the database:

1. Re-create the control files by running the `CREATE CONTROLFILE` SQL statement with the REUSE keyword, and specify MAXINSTANCES, MAXLOGFILES, and so on, as needed for the RAC configuration. The default MAXINSTANCES value is 32 (recommended).

2. Shut down the database instance.

3. If the single-instance database was using an spfile parameter file, then create a temporary PFILE from the spfile using the following SQL statement:

   ```sql
   CREATE PFILE='pfile_name' FROM spfile='spfile_name'
   ```

4. Set the CLUSTER_DATABASE parameter to TRUE. Set the INSTANCE_NUMBER parameter to a unique value for each instance, using the `sid.parameter=value` syntax.

   If you optimized memory usage on the single-instance database, adjust the size of the System Global Area (SGA) to avoid swapping and paging when you convert to RAC. This is because RAC requires about 350 bytes for each buffer to
accommodate the Global Cache Service (GCS). For example, if you have 10,000 buffers, RAC requires about 350 * 10,000 bytes more memory. Therefore, adjust the size of the SGA by changing the `DB_CACHE_SIZE` and `DB_nK_CACHE_SIZE` parameters accordingly.

5. Start the database instance using the PFILE created in Step 3.

6. If the single-instance database was using automatic undo management, then create an undo tablespace for each additional instance using the `CREATE UNDO TABLESPACE` SQL statement.

7. Create redo threads that have at least two redo logs for each additional instance. Enable the new redo threads by using an `ALTER DATABASE` SQL statement. Then shut down the database instance.

8. Copy the Oracle password file from the initial node, or from the node on which you are working, to the corresponding location on the additional nodes on which the cluster database will have an instance. Ensure that you replace the `ORACLE_SID` name in each password file for each additional instance.

9. Add `REMOTE_LISTENER=LISTENERS_DB_NAME` and `sid.LOCAL_LISTENER=LISTENER_SID` parameters to the PFILE.

10. Configure the Oracle Net Services entries for the database and instances and address entries for the `LOCAL_LISTENER` for each instance and `REMOTE_LISTENER` in the `tnsnames.ora` file, and copy it to all nodes.

11. Create the spfile from the PFILE as described in Section 6.12.2, "Procedures for Upgrading to the Server Parameter File".

12. Create the `ORA_ROOT:[DBS]initSID.ora` file that contains the following entry:

   ```sql
   spfile='spfile_path_name'
   ```

   where `spfile_path_name` is the complete path name of the spfile.

13. Add the configuration for the RAC database and its instance-to-node mapping using the SRVCTL utility.

14. Start the RAC database using SRVCTL.

    After starting the database with SRVCTL, the conversion process is complete. For example, you can run the following SQL statement to see the status of each instance in the RAC database:

    ```sql
    SELECT * FROM v$active_instances
    ```

---

**D.4.2.4 Single-Instance Database on a Cluster Running from a RAC-Disabled Oracle Home**

This installation is possible if you performed a one-node cluster (with RAC) installation but later disabled the RAC feature by unlinking it from the oracle binary before creating the single-instance database. However, you can also select the local, noncluster selection on the Node Selection screen to create a single-instance home on a cluster that is not RAC-enabled.

Perform the following procedures to convert this type of single-instance database to a RAC database:

1. On the cluster node where the single-instance database is running, run Step 1 of Section D.4.2.1, "Single Instance on a Cluster Running from a Cluster-Enabled Oracle Home".

2. Set default to the `bin` subdirectory in the `rdbms` directory in the Oracle home.
3. Relink the oracle binary as follows:
   - Shut down the database if it is already running.
   - Remove the oracle binary by running the following command:
     
```
$ remoracle
```
   - Create the single-instance database by running the following command:
     
```
$ set def ora_rdbms_admin
$ @ins_rdbms ioracle
```
   - Run the following command:
     
```
$ insoracle
```

4. Continue with Step 2 on page D-5.

D.4.2.5 Single-Instance Database on a Cluster Running from a Noncluster-Installed Oracle Home

This installation is only possible if you selected the local installation option on the Specify Hardware Cluster Installation screen during an Oracle Database 10g installation.

To covert this database to a RAC database, perform the procedures described under the following headings:

- Section D.4.1.1, "Backing Up the Original Single-Instance Database"
- Section D.4.1.2, "Performing the Preinstallation Steps"
- Section D.4.1.3, "Setting Up the Cluster"
- Section D.4.1.5, "Installing Oracle Database 10g with RAC"

Ensure that you select a new Oracle home other than the one from which the single-instance database was running.

D.5 Postconversion Steps

After completing the conversion, note the following points as described in the RAC documentation:

- Follow the recommendations for using load balancing and transparent application failover (TAF) as described in Oracle Real Application Clusters Administration and Deployment Guide (B14197-01).
- Use locally managed tablespaces instead of dictionary-managed tablespaces to reduce contention and manage sequences in RAC as described in Oracle Real Application Clusters Deployment and Performance Guide (B10768-02).
- Follow the guidelines for configuring an interconnect, using automatic segment space management, and using SRVCTL to administer multiple instances as described in Oracle Real Application Clusters Administration and Deployment Guide (B14197-01).

The buffer cache and shared pool capacity requirements in RAC are slightly greater than those in single-instance Oracle Databases. Therefore, you may want to increase the size of the buffer cache by about 10% and the size of the shared pool by about 15%.
Table D–1 shows the hierarchical directory tree of a sample database for RAC on OpenVMS-based systems.

Table D–1 Directory Structure for a Sample OpenVMS Environment

<table>
<thead>
<tr>
<th>Root Level</th>
<th>Second Level</th>
<th>Third Level</th>
<th>Fourth Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORACLE_HOME</td>
<td>[.admin]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[.db_unique_name]</td>
<td></td>
<td></td>
<td>Administrative directory</td>
</tr>
<tr>
<td>[.bdump] [.cdump] [.hdump] [.pfile] [.udump]</td>
<td></td>
<td></td>
<td>Database unique name, the same as dbname when the database name is eight or fewer characters in length</td>
</tr>
<tr>
<td>ORA_CRS_HOME</td>
<td>[.bin]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[.network]</td>
<td>[.network]</td>
<td></td>
<td>Subtree for Oracle Net</td>
</tr>
</tbody>
</table>

See Also: Oracle Database Administrator’s Reference (B13738-01) for more information about the ORACLE_HOME and admin directories.
Installing, Configuring, and Running EMAgent

This appendix describes Enterprise Manager Agent (EMAgent) for Oracle Database 10g release 1 (10.1.0.3.0). It includes information about the following topics:

- Section E.1, "Introduction to EM Framework"
- Section E.2, "Installation Requirements"
- Section E.3, "Installation and Configuration"
- Section E.4, "Management and Maintenance"
- Section E.5, "Supported Targets and Jobs"
- Section E.6, "Known Limitations"

E.1 Introduction to EM Framework

This release of EMAgent is different from the previous releases of Oracle Intelligent Agent in terms of architecture and implementation. EMAgent is part of the Enterprise Manager Framework. The DBConsole and Application Control components are not supported on Oracle Database 10g for OpenVMS. To use EMAgent that is shipped with the Oracle Database bundle for hp OpenVMS Alpha, it is necessary to install the Oracle Management Server (OMS) component of Grid Control Enterprise Manager on a UNIX-based or Microsoft Windows-based computer. EMAgent running on OpenVMS will register with and function in coordination with the OMS.

EMAgent version shipped with Oracle Database 10g will not work with Enterprise Manager used with previous releases.

EMAgent is implemented in C, Java, and Perl. Unlike earlier versions, TCL scripts are no longer used. These are replaced by Perl scripts. Perl version 5.6 is included in Oracle Database Server Kit. Oracle Universal Installer automatically installs Perl. It is not required to install a separate Perl kit. Note that this kit includes Oracle-specific DBD or DBI, and is therefore, the only supported Perl kit for use with Oracle Database. The logical \texttt{PERL\_ROOT} will be defined to the physical path \texttt{ORA\_ROOT: [PERL]} as a job level logical. To avoid potential conflict with Perl from any other kit, including any future versions supplied by Oracle, it is recommended not to convert this logical to a GROUP or SYSTEM logical.

The Job model supported in previous releases is still available in this release in a similar, but not identical, fashion. Jobs can be submitted, their status can be monitored, and their output checked. The Event model, as it existed in earlier versions, is no longer available. Instead, what is available is Targets. Refer to Section E.5, "Supported Targets and Jobs" for more information.
Installation Requirements

E.2 Installation Requirements

EMAgent has been implemented to run in a batch queue. It is necessary to specify the name of a batch queue either prior to or after installation. You must define a logical ORA_BATCH_QUEUE_hostname (a Process or Job logical is sufficient) to the name of the batch queue to be used for running EMAgent. In addition to running in the batch queue, EMAgent also submits a number of other tasks, typically related to actions required on other Oracle installations on the same host.

The hostname part of the logical should be the same as the value of the TCPIP$INET_HOST logical. The batch queue specified should run at the same priority level as all other general purpose processes on the system, typically 4.

For example, a typical batch queue recommended is as follows:

```
/Base_Priority=4 /CPU_DEFAULT=INFINITE /CPU_MAXIMUM=INFINITE /JOB_LIMIT=100
/OFF=SYSTEM /PROTECTION=(S:M,O:RSD,G:S,W:S)
```

EMAgent internally spawns a number of subprocesses and detached processes to run a majority of its tasks. The type of actions performed in these processes ranges widely from running simple DCL commands to running Java applications. It is imperative that the account used to install and run EMAgent not modify the typical OpenVMS session environment in any way that would alter the expected output of normal DCL commands. The login.com file of the account used to start or stop the agent should not have any such redefinitions. If the redefinitions are required for any reason, then it is recommended that they be disabled in the batch mode, because EMAgent runs in the batch mode.

E.3 Installation and Configuration

When you initially run Oracle Universal Installer, it instantiates certain files under the ORA_ROOT:[SYSMAN.EMD] and ORA_ROOT:[SYSMAN.CONFIG] directories. These are the Targets files and the Properties files. However, these cannot be used directly. EMAgent is configured correctly when DBCA is run. The configuration files are created under a separate directory structure (ORA_ROOT:[Hostname_SID.SYSMAN ...]). Because the DB Console is not supported on OpenVMS, it is necessary to make certain manual changes to the configuration file or files before starting EMAgent.

Manual Changes Required Before Attempting to Start EMAgent

You must manually change the following properties in the ORA_ROOT:[Hostname_SID.SYSMAN.CONFIG]emd.properties file before starting EMAgent.

1. REPOSITORY_URL

   This property is required to allow EMAgent to upload data to a central Grid Control EM Repository. When EMAgent starts, it registers its targets and other host configuration information with the Oracle Management Server (OMS) so that they are displayed on the Grid Control EM Console. It is then possible to manage the targets from the EM Console. A sample REPOSITORY_URL property is as follows:

```
REPOSITORY_URL=http://orclhost01.us.oracle.com:4889/em/upload
```
2. agentTZRegion

This property indicates the time zone in which EMAgent is running. To update this property in the `emd.properties` file, run the following command:

```
$ emctl config agent updateTZ
```

A sample `agentTZRegion` property for Pacific Standard Time is as follows:

```
agentTZRegion=-08:00
```

E.4 Management and Maintenance

This section describes the procedures to manage and maintain EMAgent.

- Section E.4.1, "Startup, Shutdown, and Status"
- Section E.4.2, "Troubleshooting and Maintenance"

E.4.1 Startup, Shutdown, and Status

Perform the following steps to start, shut down, or view the status of EMAgent:

- After the manual configuration is complete, run the following command to start EMAgent:
  
  ```
  $ emctl start agent
  ```

- To shut down EMAgent, run the following command:
  
  ```
  $ emctl stop agent
  ```

- To query the status of EMAgent at any time, run the following command:
  
  ```
  $ emctl status agent
  ```

**Note:** EMAgent is the only mechanism of communication between the Oracle Management Server and targets or applications running on the host. Therefore, it is not possible to start up or shut down EMAgent from the EM Console.

E.4.2 Troubleshooting and Maintenance

Perform the following tasks to manage or troubleshoot EMAgent:

- Section E.4.2.1, "EMAgent Fails to Start"
- Section E.4.2.2, "Extended File Specification (EFS) Characteristics"
- Section E.4.2.3, "TMP Directory"
- Section E.4.2.4, "Monitoring the Batch Queue"
- Section E.4.2.5, "Disk Space on EMAgent Install Area"
- Section E.4.2.6, "Resetting EMAgent Environment"

E.4.2.1 EMAgent Fails to Start

If EMAgent fails to start, check the following files for typical error messages:
Batch Job Log File

EMAgent is submitted as a batch job into the agent batch queue whenever it is started. Each time EMAgent starts, a fresh batch log file is created, which is available at ORA_ROOT:[SYSMAN.LOG]start_agent_host.log. Refer to the latest version of this log file. If it is readable (not locked by a running EMAgent process), look through the file to see if there are any failure messages. Typical errors would be Failure to launch the EMAgent because of some issues with related shared libraries.

EMAgent Log and Trace Files

If there are no errors in ORA_ROOT:[SYSMAN.LOG]start_agent_host.log, look at the emagent.trc and emagent.log files. These are located in the ora_root:[host_sid.sysman.log] directory. A common error is Address already in use, when the port number on which EMAgent is listening is being used by some other application.

E.4.2.2 Extended File Specification (EFS) Characteristics

EMAgent requires an extended file-specifications environment to handle files with multiple dots in their names, long file names, and so on. The default Oracle environment (after running orauser.com) does not provide this environment. Internally, EMAgent tools set up this extended environment when started, and reset the environment back to the original when completed. In a normal run, it is not necessary for an EMAgent administrator to require this environment for interactive use. However, in certain situations, when there are failures due to interruption in the host system, or due to lack of resources, it may be required to manually manipulate certain files, which in turn, would need the EFS environment.

There are two scripts included with EMAgent kit that provides the EFS environment:

- ORA_ROOT:[SYSMAN.BIN]EFS.COM
  Sets the EFS environment that includes extended parsing, extended file names, and so on.

- ORA_ROOT:[SYSMAN.BIN]NOEFS.COM
  Resets the environment back to normal, that is, traditional parsing, standard file names, and so on.

For convenience, two DCL symbols have been created to set and reset the EFS environment. Symbol EMDEFS sets the EFS environment, and symbol NOEMDEFS resets the EFS environment.

E.4.2.3 TMP Directory

EMAgent run time creates a number of temporary files during processing. All temporary files are created in a directory linked to the logical ORA_AGENT_TMP. This logical is automatically defined to the physical path, ORA_ROOT:[SYSMAN.host.TMP], when setting up the Oracle environment.

It is possible that certain temporary files may not get cleaned out due to interruptions, failures, and so on. It is recommended that this directory content be monitored on a periodic basis and cleaned out if it has files that are more than three hours old.

E.4.2.4 Monitoring the Batch Queue

As mentioned in Section E.2, "Installation Requirements", EMAgent runs as a batch job in a batch queue. EMAgent also submits a number of jobs to the batch queue for tasks related to monitoring, start up, shut down, and so on, of databases, listeners, and so on, running in other Oracle installations. There is a possibility that broken
environments in these installations could cause these submitted jobs to stop responding. It is recommended that the batch queue be periodically monitored for any long-pending jobs (any job of more than three hours is long-pending) and such jobs be deleted.

E.4.2.5 Disk Space on EMAgent Install Area

There are two agent parameters listed in the emd.properties properties file related to disk space:

- UploadMaxDiskUsedPct
- UploadMaxDiskUsedPctFloor

Ensure that the agent parameters are set correctly at the required level. When the value of max disk pct used exceeds, uploads will stop and all subsequent updates from EMAgent to the Oracle Management Server also will stop. At this time, while querying EMAgent status would show it as up and running, the line reporting Last Successful Upload would show a time stamp that would remain the same over a longer period. Comparing this with the value of the UploadInterval parameter in the emd.properties file would reflect the correct status of uploads.

E.4.2.6 Resetting EMAgent Environment

You can shut down EMAgent that is already running, and reconfigure it to point to a different Oracle Management Server. To reset EMAgent environment, it is recommended to perform the following tasks:

2. Delete all files in the ora_root:[[host_id].sysman.emd.upload] directory.
3. Delete all files in the ora_root:[[host_id].sysman.emd.state] directory.
5. Delete all files in the ora_root:[[host_id].sysman.emd.recv] directory.
6. Rename or delete EMAgent log and trace files:

   ora_root:[[host_sid].sysman.log]emagent.log
   ora_root:[[host_sid].sysman.log]emagent.trc

E.5 Supported Targets and Jobs

The following targets and jobs are supported by EMAgent.

**Targets**

EMAgent supports the following targets:

- Agent
- Host
- Database
- Listener
- Cluster Database (RAC)
- Cluster

When EMAgent is started, EMAgent reads the targets.xml file in the EMSTATE directory, and registers those targets with the Oracle Management Server. The status
of each of the targets is reflected under the Targets tab of the EM Console. EMAgent monitors the registered targets on a periodic basis and uploads the status of the targets to the Oracle Management Server, which is reflected on the EM Console. In addition, a set of predefined metrics are also collected for each target and uploaded to the Oracle Management Server. Default thresholds are defined for each predefined metric on the Oracle Management Server. When a threshold is reached, an alert is generated and displayed on the console. This mechanism of automatic target monitoring replaces the Events model of earlier releases. For more information about targets, refer to Oracle® Enterprise Manager Concepts 10g release 1 (10.1).

Jobs
The following jobs are supported by EMAgent:

- Operating System Command
- SQL Script

E.6 Known Limitations

EMAgent has the following known limitations:

1. Jobs will always indicate a successful completion status, as long as the agent has been able to create a detached process and run the command specified for the job. The status of job completion is not a reflection of the completion status of the job command. If the command fails for some reason, then the job itself will not be indicated as a failure, but the output of the job needs to be checked to verify if the command has succeeded or not.

2. The metric browser does not support all metrics. All metrics in the host metrics area are not applicable to Oracle Database. For more details, refer to the readme_vms_10gr1.txt file shipped with the Oracle Database Server Kit.
Default Port Numbers

During the installation, Oracle Universal Installer assigns port numbers to components from a set of default port numbers. This appendix lists the default port numbers and describes how to change the assigned port after installation. It includes information about the following topics:

- Section F.1, "Components and Port Ranges"
- Section F.2, "Changing the Oracle Enterprise Manager Agent HTTP Port"

F.1 Components and Port Ranges

Table F–1 lists the ports that are used by components configured during the installation. By default, the first port in the range is assigned to the component, if it is available.

Table F–1 Components and Port Ranges

<table>
<thead>
<tr>
<th>Component</th>
<th>Port</th>
<th>Port Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise Manager Agent</td>
<td>HTTP</td>
<td>1830 - 1849</td>
</tr>
</tbody>
</table>

F.2 Changing the Oracle Enterprise Manager Agent HTTP Port

To change the Oracle Enterprise Manager Agent HTTP port, edit the ORA_ROOT:[host_sid.sysman.config]emd.properties file, and modify the following parameter as shown:

EMD_URL=http://host.domain:1830/emd/main
This appendix contains information about troubleshooting. It includes information about the following topics:

- Section G.1, "Verifying Requirements"
- Section G.2, "X Window Display Errors"
- Section G.3, "Errors During Installation"
- Section G.4, "Reviewing the Log of an Installation Session"
- Section G.5, "Troubleshooting Configuration Assistants"
- Section G.6, "Silent Response File Error Handling"
- Section G.7, "Cleaning Up After a Failed Installation"

G.1 Verifying 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 preinstallation tasks specified in Chapter 2, "Preinstallation Tasks".

Read the Release Notes

G.2 X Window Display Errors

If you are running Oracle Universal Installer on a remote system and you want to display the Oracle Universal Installer user interface on a local system, you may see error messages similar to the following:

%DECW-E-CANT_OPEN_DISPL, Can't open display

If you see the preceding error message, and the X server is running on a UNIX host, then:

1. In a local terminal window, log in as the user that started the X Window session.
2. Enter the following command:
   
   $ xhost +
3. Enter the following commands, where \textit{workstation\_name} is the host name or IP address of your workstation:

- Bourne, Bash, or Korn shell:
  
  $ \text{DISPLAY}=$\text{workstation\_name}:0.0

  $ \text{export DISPLAY}$

- C or tcsh shell:
  
  % \text{setenv DISPLAY} \text{workstation\_name}:0.0

4. To determine whether X Window applications display correctly on the local system, enter the following command:

   $ \text{xclock}$

   The X clock should be displayed on the monitor.

5. If the X clock is displayed, then close X clock and start Oracle Universal Installer again.

\hrulefill

\textbf{Note:} This procedure applies only to users of UNIX workstations. If you are using a PC or other system with X server software installed, refer to the X server documentation for information about how to permit remote systems to display X applications on the local system.

---

\textbf{G.3 Errors During Installation}

If you encounter an error during installation:

- Do not exit Oracle Universal Installer.

- If you clicked \textbf{Next} after you entered incorrect information about one of the installation screens, click \textbf{Back} to return to the screen and correct the information.

- If you encounter an error while Oracle Universal Installer is copying or linking files, refer to Section G.4, "Reviewing the Log of an Installation Session".

- If you encounter an error while a configuration assistant is running, refer to Section G.5, "Troubleshooting Configuration Assistants".

- If you cannot resolve the problem, remove the failed installation by following the steps listed in Section G.7, "Cleaning Up After a Failed Installation".

\textbf{G.4 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, review the log file for information about possible causes of the problem.

To view the log file:

1. Determine the location of the \textit{oraInventory} directory with the following command:

   \texttt{sys$login:[hostname]oraInst.loc}

   The \textit{inventory\_loc} parameter in this file specifies the location of the \textit{oraInventory} directory.
2. Navigate to Oracle Universal Installer log file directory, where `orainventory_location` is the location of the `oraInventory` directory:

   ```
   $ set default [orainventory_location.logs]
   ```

3. Enter the following command to determine the file name of the log file:

   ```
   $ dir
   ```

   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. If an error displayed by Oracle Universal Installer or listed in the log file indicates a relinking problem, refer to the following file for more information:

   ```
   ora_root:[install]make.log
   ```

### G.5 Troubleshooting Configuration Assistants

To troubleshoot an installation error that occurs when a configuration assistant is running:

- Review the installation log files listed in Section G.4, "Reviewing the Log of an Installation Session".
- Review the specific configuration assistant log file located in the `ora_root:[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 Section G.5.2, "Fatal Errors" for further instructions.

#### G.5.1 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:

```
device:[orainventory_location.logs]installActionsdate_time.log
``` 

The execution status codes are listed in Table G–1:

<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 canceled</td>
<td>-1</td>
</tr>
</tbody>
</table>

#### G.5.2 Fatal Errors

If you receive a fatal error while a configuration assistant is running, you must remove the current installation and reinstall the Oracle software as follows:

1. Remove the failed installation as described in Section G.7, "Cleaning Up After a Failed Installation".
2. Correct the cause of the fatal error.
3. Reinstall the Oracle software.

G.6 Silent Response File Error Handling

To determine whether a silent installation succeeds or fails, refer to the following log file:

device:[orainventory_location.logs]silentInstalldate_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 run time. If the validation fails, then the silent 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.

G.7 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 Section 3.3.1, "Installing Oracle Database from the Hard Drive".
2. Click Deinstall Products on the Welcome screen or click Installed Products on any Installer screen.

   The Inventory screen is displayed, 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.
This appendix lists the procedure and steps to install and configure Apache Server for OpenVMS. The following topics are included:

- Section H.1, "Postinstallation Checklist"
- Section H.2, "Test the Installation"
- Section H.3, "Running Oracle HTTP Server on OpenVMS"
- Section H.4, "Security Information"
- Section H.5, "Open Source Licenses"

H.1 Postinstallation Checklist

After you configure Oracle HTTP Server for OpenVMS, perform the following tasks to ensure a successful startup:

- Section H.1.1, "Running AUTOGEN"
- Section H.1.2, "Check Disk Quota"
- Section H.1.3, "Checking for SET TERMINAL/INQUIRE"

Each of these tasks is explained in the following sections. Once you have completed these, you can test the installation by starting Oracle HTTP Server.

H.1.1 Running AUTOGEN

After the installation, run `SYS$UPDATE:AUTOGEN.COM (AUTOGEN)` to evaluate the system parameters and make adjustments based on the hardware configuration and system workload. On Oracle HTTP Server, AUTOGEN will probably increase the page file size and the number of swap file pages.

H.1.2 Check Disk Quota

If the disk quota is too low, then Oracle HTTP Server will not start. Either raise the disk quota for the oracle user account, or grant the account the EXQUOTA privilege, which enables it to bypass disk quota restrictions. Use the following commands:

```
$ SHOW QUOTA/USER={[server-uic]}/DISK=device_name
$ SET PROCESS/PRIVILEGES=EXQUOTA node-name::ORACLE
```

H.1.3 Checking for SET TERMINAL/INQUIRE

When Oracle HTTP Server for OpenVMS is started, the following login files are run:
Test the Installation

You must manually start Oracle HTTP Server to verify the installation and configuration of the server. Enter the following command:

$ APACHECTL START

Perform the following tasks to test the installation:

- Section H.2.1, "Browser Test"
- Section H.2.2, "TELNET Test"
- Section H.2.3, "Troubleshooting"

H.2 Test the Installation

You must manually start Oracle HTTP Server to verify the installation and configuration of the server. Enter the following command:

$ APACHECTL START

Perform the following tasks to test the installation:

- Section H.2.1, "Browser Test"
- Section H.2.2, "TELNET Test"
- Section H.2.3, "Troubleshooting"

H.2.1 Browser Test

You can test the installation using a Web browser. Replace host.domain in the following URL with the corresponding information about Oracle HTTP Server that you installed:

HTTP://host.domain:port

If this is a new installation, then the browser should display the standard introductory screen with the following bold text at the top:

"If you see this, it means that the installation of the Apache Web server software on this system successful."

The Apache logo is displayed at the bottom.

H.2.2 TELNET Test

You can also use TELNET on the local host to test the installation. Use the following procedure:

1. Enter the following command:

   $ TELNET 0 80

   The following text is displayed:

   %TELNET-I-TRYING, Trying ... 127.0.0.1
   %TELNET-I-SESSION, Session 01, host localhost, port 80
   ^TELNET-I-ESCAPE, Escape character is ^]"

2. Press the Enter key and enter the following HTTP command:

   HEAD / HTTP/1.0
3. Press the Enter key twice. If the installation is successful, text similar to the following should be displayed:

HTTP/1.1 200 OK
Date: Tue, 23 May 2000 17:05:05 GMT
Server: Apache/1.3.12 (OpenVMS)
Last-Modified: Mon, 22 May 2000 15:33:27 GMT
ETag: "33dfec-681-39295347"
Accept-Ranges: bytes
Content-Length: 1665
Connection: close
Content-Type: text/html
%TELNET-S-REMCLOSED, Remote connection closed
-TELNET-I-SESSION, Session 01, host localhost, port 80

H.2.3 Troubleshooting
If you do not receive a response from Oracle HTTP Server, check the following:

- In the SYLOGIN.COM file, ensure that there is no SET TERMINAL/INQUIRE statement for network processes.
- Look for the following files:
  APACHE$ROOT:[000000]APACHE$SERVER.LOG
  APACHE$ROOT:[LOGS]ERROR_LOG

H.3 Running Oracle HTTP Server on OpenVMS
The default port for Oracle HTTP Server is port 7777. If this port is already in use by another application, or if you would like to use a different port, then modify the httpd.conf file located in the ORA_ROOT:[Apache.Apache.SPECIFIC...CONF] to specify a different port number.

The following subsections describes the process of running the Oracle HTTP server:

- Section H.3.1, "Starting and Stopping the Server"
- Section H.3.2, "Server Log File"
- Section H.3.3, "Customizing the Server Environment"
- Section H.3.4, "How to Configure Apache"
- Section H.3.5, "Modules and Directives"
- Section H.3.6, "Supported and Unsupported Features"
- Section H.3.7, "File Formats"
- Section H.3.8, "File Naming Conventions"
- Section H.3.9, "File Transfer Process and Access Control List"
- Section H.3.10, "Logical Names"
- Section H.3.11, "OpenVMS Cluster Considerations"
- Section H.3.12, "CGI Programs"

H.3.1 Starting and Stopping the Server
To start Oracle HTTP Server, enter the following command:

$ APACHECTL startup
To stop Oracle HTTP Server, enter the following command:

```
$ APACHECTL stop
```

### H.3.2 Server Log File

The server log file for `APACHE$WWW` is written to:

```
APACHE$SPECIFIC:[000000]APACHE$SERVER.LOG
```

### H.3.2.1 Performance Considerations

You should have prior experience in tuning the performance of the OpenVMS operating system. For general information about OpenVMS performance, refer to the OpenVMS Performance Management Manual at

http://h71000.www7.hp.com/doc/73final/6491/6491PRO.HTML

Recommendations for improving performance on Oracle HTTP Server are provided in this appendix and the Release Notes.

### H.3.2.2 Limits and Quotas for Light to Moderate Load

Table H–1 shows sample values for the `oracle` account from a working and exercised Oracle HTTP Server with a light to moderate load. These values are presented as an example of a system performing well within its context.

If you should experience performance difficulties, refer to this table for guidelines about making adjustments. Remember that no one set of values will be appropriate for all situations.

<table>
<thead>
<tr>
<th>Table H–1 Sample Values for the <code>oracle</code> account</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameter</strong></td>
</tr>
<tr>
<td>ASTLM (NonPooled)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>BIOLM (NonPooled)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>BYTLM (Pooled)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CHANNELCNT</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>DIOLM (NonPooled)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ENGLM (Pooled)</td>
</tr>
</tbody>
</table>
To change the quotas for the SYSUAF account, use the system manager account and run the AUTHORIZE utility as follows:

```bash
$ SET DEFAULT SYS$SYSTEM
$ RUN AUTHORIZE
UAF> SHOW ORACLE
Username: ORACLE Owner: APACHE WEBSERVER
... Maxjobs: 0 Fillm: 100 Bytlm: 64000
Maxacctjobs: 0 Shrfillm: 0 Phylm: 0
Prclm: 8 DIOlm: 150 WSdef: 2000
...
UAF> MODIFY ORACLE/FILLM=300/PRCLM=20
%UAF-I-MDFYMSG, user record(s) updated
UAF> EXIT
$ 
```

### H.3.2.3 Server with Medium to High Load

After you install the server and run it, look in the log file for errors of the “cannot open” type. Errors of this type often indicate that you need to modify system parameters.

Try the following:

- Set FILLM to limit the number of files that a user process can have open.
- Set the SYSGEN parameter, CHANNELCNT, to 1024 (unless it is already set to a higher value).
H.3.2.4 Global Pages and Global Sections
If a browser installation stalls, then this could be an indication that the number of
global pages or global sections is too low. Run AUTOGEN to evaluate the number of
global pages and global sections that you need. Some browsers may need more.

H.3.2.5 Excessive File Build Up
A large number of .LOG and .PID files can amass over time in the
APACHE$ROOT:[0000000] and APACHE$ROOT:[LOGS] directories. Purging these
files can become a burden on application or system managers. System managers
should manually use explicit SET DIRECTORY/VERSION commands on these two
directories.

H.3.3 Customizing the Server Environment
The installation procedure creates a file named httpd.conf and places it in
APACHE$ROOT:[CONF]. The httpd.conf file stores information that Oracle HTTP
Server uses to set up the server environment. The httpd.conf file has been tailored to
use OpenVMS syntax, but its overall functionality is essentially identical to httpd.conf
on the UNIX platform.

The httpd.conf file contains an explanation for each line that it can process. You can
refer to these explanations when customizing the file for your environment. You can
also refer to any generally available Apache documentation on httpd.conf.

Note the following about httpd.conf on OpenVMS:

■ MOD_OSUSCRIPT has been added to enable CGI scripts that were originally
  written for the OSU server.

■ UNIX-style path names are recognized by OpenVMS. You can use either
  UNIX-style or OpenVMS-style path names in the configuration file. However, you
  cannot mix the two styles within a specification.

■ In an OpenVMS Cluster, you can specify either clusterwide or system-specific
  files.

H.3.4 How to Configure Apache
Perform the following steps to configure Apache to run while using an account other
than the oracle account:

1. Modify the httpd.conf file to include the following line:
   
   User username

2. Modify APACHEUSER.COM to set the logical APACHE_USERNAME to the required
   user name. Ensure that the user name is exactly the same as the entry in the
   httpd.conf file.

3. Restart the Apache Server if it is already running.

Note: Whenever you change system parameters, you must restart
the system to enable the new settings.
H.3.5 Modules and Directives

Following is a list of the modules that are included in Oracle HTTP Server for the OpenVMS distribution kit. The list shows the directives supported in each module. All supported modules and directives function as documented by the Apache Software Foundation at

http://www.apache.org/docs

- HTTP_CORE.C
  - AccessConfig
  - AccessFileName
  - AllowOverride
  - AuthName
  - AuthName
  - AuthType
  - BindAddress
  - CoreDumpDirectory
  - DefaultType
  - <Directory>
    - <DirectoryMatch>
  - DocumentRoot
  - ErrorDocument
  - ErrorLog
  - <Files>
    - <FilesMatch>
  - HostnameLookups
  - IdentityCheck
  - <IfDefine>
  - <IfModule>
  - Include
  - KeepAlive
  - KeepAliveTimeout
    - <Limit>
    - <LimitExcept>
  - LimitRequestBody
  - LimitRequestFields
  - LimitRequestLine
  - Listen
  - ListenBacklog
  - <Location>
- <LocationMatch>
- LogLevel
- MaxClients
- MaxKeepAliveRequests
- MaxRequestPerChild
- MaxSpareServers
- MinSpareServers
- NameVirtualHost
- Options
- PidFile
- Port
- Require
- ResourceConfig
- RLimitCPU
- RLimitMEM
- RLimitNPROC
- Satisfy
- SendBufferSize
- ServerAdmin
- ServerAlias
- ServerName
- ServerPath
- ServerRoot
- ServerSignature
- ServerTokens
- ServerType
- StartServers
- TimeOut
- UseCanonicalName
- User
- VirtualHost

- MOD_ACCESS.C
  - allow
  - deny
  - order

- MOD_ACTIONS.C
  - Action
- Script
  - MOD_ALIAS.C
    - Alias
    - AliasMatch
    - Redirect
    - RedirectMatch
    - RedirectTemp
    - RedirectPermanent
    - ScriptAlias
    - ScriptAliasMatch
  - MOD_ASIS.C
  - MOD_AUTH.C
    - AuthGroupFile
    - AuthUserFile
    - MOD_AUTOINDEX.C
      - AddAlt
      - AddAltByEncoding
      - AddAltByType
      - AddDescription
      - AddIcon
      - AddIconByEncoding
      - AddIconByType
      - DefaultIcon
      - FancyIndexing
      - HeaderName
      - IndexIgnore
      - IndexOptions
      - IndexOrderDefault
      - ReadmeName
  - MOD_CGI.C
    - ScriptLog
    - ScriptLogBuffer
    - ScriptLogLength
  - MOD_DIR.C
    - DirectoryIndex
  - MOD_ENV.C
    - SetEnv
- UnsetEnv
  - MOD_IMAP.C
    - ImapBase
    - ImapDefault
    - ImapMenu
  - MOD_INCLUDE.C
  - MOD_INFO.C
    - AddModuleInfo
  - MOD_LOG_CONFIG.C
    - CustomLog
    - LogFormat
    - TransferLog
  - MOD_MIME.C
    - AddCharset
    - AddEncoding
    - AddHandler
    - AddLanguage
    - AddType
    - DefaultLanguage
    - ForceType
    - RemoveHandler
    - SetHandler
    - TypesConfig
  - MOD_NEGOTIATION.C
    - CacheNegotiatedDocs
    - LanguagePriority
  - MOD_SETENVIF.C
    - BrowserMatch
    - BrowserMatchNoCase
    - SetEnvIf
    - SetEnvIfNoCase
  - MOD_SO.C
    - LoadModule
  - MOD_STATUS.C
    - ExtendedStatus
  - MOD_UNIQUE_ID.C
  - MOD_USERDIR.C
H.3.6  Supported and Unsupported Features

Information about running Oracle HTTP Server that is specific to running the server on OpenVMS is provided in the following sections.

See Also:  For more information about on the Apache server, refer to the Apache Software Foundation Web site at

http://www.apache.org/docs/

H.3.6.1  Modules Not Included

The following modules are not included in this version of Oracle HTTP Server:

- MOD_AUTH_ANON
- MOD_AUTH_DB
- MOD_AUTH_DBM
- MOD_AUTH_DIGEST
- MOD_CERN_META
- MOD_DIGEST
- MOD_EXAMPLE
- MOD_EXPIRES
- MOD_HEADERS
- MOD_ISAPI
- MOD_JSERVE
- MOD_LOG_AGENT
- MOD_LOGREFERER
- MOD_MIME_MAGIC
- MOD_MMAP_STATIC
- MOD_PEARL
- MOD_PROXY
- MOD_REWRITE
- MOD_SPELING
- MOD_SSL
- MOD_USERTRACK
- MOD_VHOST_ALIAS

H.3.6.2  Unsupported Directives

The following directives are not supported on OpenVMS:

- AgentLog
- AllowCONNECT
- Anonymous
- Anonymous_Authoritative
- Anonymous_LogEmail
- Anonymous_MustGiveEmail
- Anonymous_NoUserID
- Anonymous_VerifyEmail
- AuthDBAuthoritative
- AuthDBGroupFile
- AuthDBMAuthoritative
- AuthDBMGroupFile
- AuthDBUserFile
- AuthDBMUserFile
- AuthDigestFile
- CacheDefaultExpire
- CacheDirLength
- CachedirLevels
- CacheForceCompletion
- CacheGcInterval
- CacheLastModifiedFactor
- CacheMaxExpire
- CacheRoot
- CacheSize
- CheckSpelling
- CookieExpires
- CookieTracking
- Example
- ExpiresActive
- ExpiresByType
- ExpiresDefault
- Header
- Metadir
- MetaFiles
- MetaSuffix
- MimeMagicFile
- MMMapFile
- NoCache
- ProxyBlock
- ProxyDomain
■ ProxyPass
■ ProxyPassReverse
■ ProxyReceiveBufferSize
■ ProxyRemote
■ ProxyRequests
■ ProxyVia
■ RefererIgnore
■ RefererLog
■ RewriteBase
■ RewriteCond
■ RewriteEngine
■ RewriteLock
■ RewriteLog
■ RewriteLogLevel
■ RewriteMap
■ RewriteOptions
■ RewriteRule
■ ScriptInterpreterSource
■ VirtualDocumentRoot
■ VirtualDocumentRootIP
■ VirtualScriptAlias
■ VirtualScriptAliasIP

H.3.6.3 Command-Line Options

This section describes the HTTPD command-line options supported on Oracle HTTP Server. Before you can use these options, you must define HTTPD as a symbol as follows:

$ HTTPD := $APACHE$ROOT: [000000]APACHE_HTTPD.EXE_ALPHA

Then you can use the following format to enter a command-line option:

$ HTTPD -option

where -option is one of the following command line options:

■ -v
  Displays the HTTPD version and its build date.

■ -"V"
  Displays the HTTPD base version, its build date, and a list of compile settings that influence the performance of the server.

■ -h:
  Displays a list of the HTTPD options.
Running Oracle HTTP Server on OpenVMS

- `-l`:
  Displays a list of all modules compiled into the server.

- "L":
  Displays a list of directives with expected arguments and instances where the directive is valid.

The following example shows how to enter the "L" option to list the available configuration directives:

```
$ HTTPD -"L"
```

**H.3.6.4 Virtual Host Support**

The term, virtual host, refers to the practice of maintaining a single server to serve pages for multiple virtual hosts. Both IP-based and name-based virtual host support are available on Oracle HTTP Server for OpenVMS.

---

**Note:** The security profile of the running server is the same on all virtual hosts.

---

For more information about virtual hosts, refer to the Apache Software Foundation documentation at

[^1]: http://www.apache.org/docs/vhosts/index.html

**H.3.6.5 Dynamic Shared Object Support**

Dynamic shared object support provides a method to format code so that it will load into the address space of an executable program at run time. For more information about dynamic shared object support, refer to the Apache Software Foundation documentation at

[^2]: http://www.apache.org/docs/dso.html

**H.3.6.6 File Handlers**

Oracle HTTP Server for OpenVMS supports the ability to use file handlers explicitly. For more information about file handlers, refer to the Apache Software Foundation documentation at

[^3]: http://www.apache.org/docs/handler.html

**H.3.6.7 Content Negotiation**

The MOD_NEGOTIATION module provides content negotiation. This module enables you to specify language variants of HTML files. To specify language variants, use an underscore instead of a period before the language extension.

For example:

- On UNIX, filename.html.fr is the French variant of filename.html.
- On OpenVMS, filename.html_fr is the French variant of filename.html.

For more information about content negotiation, refer to the Apache Software Foundation documentation at

[^4]: http://www.apache.org/docs/content-negotiation.html

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[^1]: http://www.apache.org/docs/vhosts/index.html
[^2]: http://www.apache.org/docs/dso.html
[^3]: http://www.apache.org/docs/handler.html
[^4]: http://www.apache.org/docs/content-negotiation.html
H.3.6.8 Apache API
You can use the standard Apache application programming interface (API) to write user-defined modules that run on Oracle HTTP Server. For more information about the Apache API, refer to the Apache Software Foundation documentation at

http://www.apache.org/docs/misc/API.html

H.3.6.9 suEXEC Support
The suEXEC feature provides the ability to run CGI programs under user IDs that are different from the user ID of the calling Web server. This is not supported by Oracle HTTP Server for OpenVMS.

H.3.7 File Formats
All file formats are supported. However, the Web browser status bar will not show page loading progress for logical or VFC format files larger than 8 KB.

Page loading progress relies on an accurate byte count, which is not readily available for files in logical or VFC format. For files in these formats, Oracle HTTP Server must count the bytes as the files load. The counting process can slow performance, so it has been turned off in this situation.

H.3.8 File Naming Conventions
In general, users running Oracle HTTP Server for OpenVMS can specify either UNIX-style file names or OpenVMS-style file names. Oracle HTTP Server usually displays UNIX-style file names.

The On-Disk Structure Level 5 (ODS-5) volume structure, introduced in hp OpenVMS Alpha version 7.2-1, supports long file names, enables the use of a wider range of characters within file names, and preserves case within file names. However, the DEC C RTL that is shipped with hp OpenVMS Alpha version 7.2-1 does not provide full support for extended file names on ODS-5 devices. This lack of full support imposes certain restrictions on users running Oracle HTTP Server for OpenVMS.

Because mixed UNIX-style and OpenVMS-style extended file names are not yet supported by the DEC C RTL, you may be required to use UNIX-style syntax when interacting with Oracle HTTP Server. An example would be appending additional directories or a file name to a root.

The following examples illustrate mixed UNIX-style and OpenVMS-style file names that are not supported in hp OpenVMS Alpha version 7.2-1:

doc/foo.bar.bar
./tmp/foo.bar.b^_ar
~foo^..bar

You can, however, modify the last example so that it works as an OpenVMS extended file name that has a tilde (~) as the first character. Precede the leading tilde (~) with the Extended File Specifications escape character (^) as shown in the following example:

^~foo^.bar

For more information about using the tilde (~) in OpenVMS extended file names, refer to the OpenVMS Guide to Extended File Specifications at the following Web site:

http://h71000.www7.hp.com/doc/73final/6536/6536PRO.HTML

Mixed UNIX-style and OpenVMS-style file names will be supported in a future release of the DEC C RTL for hp OpenVMS Alpha.
H.3.9 File Transfer Process and Access Control List

When performing an FTP operation, ensure that the access control list (ACL) for the target directory on Oracle HTTP Server has FTP access enabled as follows:

When transferring new files:

$ SET SECURITY/ACL=(IDENTIFIER=yourFTPname,ACCESS=READ+WRITE) [directory]

When replacing existing files:

$ SET SECURITY/ACL=(IDENTIFIER=yourFTPname,ACCESS=READ+WRITE) [directory]*.*

H.3.10 Logical Names

Oracle HTTP Server for OpenVMS creates the following logical names, which are listed with their descriptions in Table H–2.

<table>
<thead>
<tr>
<th>Logical Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APACHE$COMMON</td>
<td>Concealed logical name that defines clusterwide files in APACHE$ROOT (device: [APACHE])</td>
</tr>
<tr>
<td>APACHE$FIXBG</td>
<td>System executive mode logical name pointing to installed, shareable images. Not intended to be modified by the user.</td>
</tr>
<tr>
<td>APACHE$HTTPD_SHR</td>
<td>System executive mode logical name pointing to installed, shareable images. Not intended to be modified by the user.</td>
</tr>
<tr>
<td>APACHE$INPUT</td>
<td>Used by CGI programs for PUT and POST methods of reading the input stream.</td>
</tr>
<tr>
<td>APACHE$PLV_ENABLE_username</td>
<td>System executive mode logical name defined during startup and used to control access to the services provided by the APACHE$PRIVILEGED image. Not intended to be modified by the user.</td>
</tr>
<tr>
<td>APACHE$PLV_LOGICAL</td>
<td>System executive mode logical name defined during startup and used to control access to the services provided by the image. Not intended to be modified by the user.</td>
</tr>
<tr>
<td>APACHE$PRIVILEGED</td>
<td>System executive mode logical name pointing to installed, shareable images. Not intended to be modified by the user.</td>
</tr>
<tr>
<td>APACHE$ROOT</td>
<td>System executive mode logical name defined during startup that points to the top-level directory. (device: [APACHE], device: [APACHE.SPECIFIC.node-name])</td>
</tr>
<tr>
<td>APACHE$SPECIFIC</td>
<td>Concealed logical name that defines system-specific files in APACHE$ROOT (device: [APACHE.SPECIFIC.node-name])</td>
</tr>
</tbody>
</table>
An OpenVMS Cluster is a group of OpenVMS systems that work together as one virtual system. Oracle HTTP Server runs in an OpenVMS Cluster so that you can take advantage of the resource sharing that increases the availability of services and data.

Bear the following points in mind:

- Oracle HTTP Server is supported on hp OpenVMS Alpha Version 7.1-2 or later.
Oracle HTTP Server runs in an Alpha or a mixed-architecture cluster.

**H.3.11.1 Individual System Versus Clusterwide Definition**

To define clusterwide versus individual configuration files, APACHE$ROOT uses the following concealed logical names:

- **APACHE$COMMON** defines clusterwide files
- **APACHE$SPECIFIC** defines system-specific files

When reading a file, the server first looks for a system-specific version of the file in APACHE$SPECIFIC:[directory]. If it does not find one, then it looks for a clusterwide file in APACHE$COMMON:[directory].

To avoid confusion, always use the appropriate concealed logical name to specify the file that you want to edit. For example, to edit a clusterwide version of httpd.conf, refer to:

```
$ EDIT APACHE$COMMON:[CONF]HTTPD.CONF
```

If you refer to:

```
$ EDIT APACHE$ROOT:[CONF]HTTPD.CONF
```

then the server would open the clusterwide file but save it as a system-specific version. The latest version of httpd.conf would then be visible only to the individual node on which it was saved.

Within httpd.conf itself, you should make this distinction whenever you refer to a path or to a file location. This improves performance and ensures that the server will return a complete directory listing. For example, you should specify APACHE$COMMON or APACHE$SPECIFIC (instead of APACHE$ROOT) with directory directives.

The following extract, from the httpd.conf file, refers to APACHE$COMMON, because the content for the default Web page is in the clusterwide directories.

```plaintext
DocumentRoot "/apache$common/htdocs"
...
</Directory>
```

If there was content for one specific node in a cluster, then the APACHE$SPECIFIC logical name would be used.

**H.3.11.2 Mixed-Architecture Cluster**

In a mixed-architecture cluster, do not use a cluster alias IP address with Oracle HTTP Server. Because the VAX systems will not have Oracle HTTP Server running, they will not be able to service HTTP requests.

**H.3.12 CGI Programs**

Common gateway interface (CGI) programs run within the DCL shell on Oracle HTTP Server for OpenVMS. This section discusses the following CGI topics:

- Section H.3.12.1, "CGI Environment Logical"
- Section H.3.12.2, "Referencing Input"
Section H.3.12.3, "Running CGI Images"

Section H.3.12.4, "Logicals for Debugging CGI Scripts"

Section H.3.12.5, "Displaying Graphics with CGI Command Procedures"

H.3.12.1 CGI Environment Logical

By default, an environment logical symbol takes the form that is designated by the name of the environment logical. You can determine how environment logicals are set when the server runs a CGI program. You can define the APACHE$PREFIX_DCL_CGI_SYMBOLS_WWW logical name to prefix all environment logical symbols with WWW_. By default, no prefix is used.

The APACHE$CGI_MODE logical name controls how CGI environment logicals are defined in the running CGI program as follows:

```
APACHE$CGI_MODE     option
```

where `option` can have one of the following values at a time:

- **0**: Default. Environment logicals are defined as local symbols and are truncated at 970 (limitable with DEC C).
- **1**: Environment logicals are defined as local symbols unless they are greater than 970 characters. If the environment value is greater than 970 characters, it is defined as a multi-item logical.
- **2**: Environment logicals are defined as logicals. If the environment value is greater than 512 characters, it is defined as a multi-item logical.

APACHE$DCL_ENV is a foreign symbol that lets you define CGI environment logical, as follows:

```
APACHE$DCL_ENV [-c] [-d] [-e env-file]
```

where:

- **-c**: Default. Indicates create environment logicals.
- **-d**: Indicates delete environment logicals.
- **-e env-file**: Specifies an alternate environment file.

The environment file does not need to be specified by the caller because the parent derives it (it can be easily determined by default).

The following example deletes the environment and then re-creates it:

```
Example: diff_mode_cgi.com
$ APACHE$DCL_ENV -d
$ Define APACHE$PREFIX_DCL_CGI_SYMBOLS_WWW 1
$ APACHE$DCL_ENV -c
```

H.3.12.2 Referencing Input

CGI scripts that reference input to Oracle HTTP Server must refer to APACHE$INPUT.

H.3.12.3 Running CGI Images

On OpenVMS, CGI images run within a DCL process. You cannot run CGI images directly.
H.3.12.4 Logicals for Debugging CGI Scripts

Use the following logicals to debug CGI scripts:

<table>
<thead>
<tr>
<th>Logical Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APACHE$DEBUG_DCL_CGI</td>
<td>If defined, this system logical name enables APACHE$VERIFY_DCL_CGI and APACHE$SHOW_CGI_SYMBOL.</td>
</tr>
<tr>
<td>APACHE$VERIFY_DCL_CGI</td>
<td>If defined, this system logical name provides information for troubleshooting DCL command procedure CGIs by forcing a SET VERIFY before running any DCL CGI. Enabled by APACHE$DEBUG_DCL_CGI.</td>
</tr>
<tr>
<td>APACHE$SHOW_CGI_SYMBOL</td>
<td>If defined, this system logical name provides information for troubleshooting the CGI environment by dumping all of the symbols and logicals (job/process) for a given CGI. Enabled by APACHE$DEBUG_DCL_CGI.</td>
</tr>
</tbody>
</table>

H.3.12.5 Displaying Graphics with CGI Command Procedures

To display a graphics file with a CGI command procedure, use the APACHE$DCL_BIN foreign symbol in the following format:

```
APACHE$DCL_BIN [-s bin-size] bin-file
```

where:

- `-s bin-size`: Specifies the actual or approximate file size in bytes. The value of `bin-size` is automatically determined if the image file is larger than 32768 KB (default value). If the image file is smaller than 32768 KB, then you can provide an approximate (or actual) size. This boosts performance.
- `bin-file`: Specifies the file to be displayed.

For example:

```
$ SAY := WRITE SYS$OUTPUT
$ SAY "Content-type: image/gif"
$ SAY ""
$ APACHE$DCL_BIN APACHE$ROOT:[ICONS]APACHE_PB.GIF
$ EXIT
```

Running Oracle HTTP Server on OpenVMS 3.19.

H.4 Security Information

Oracle HTTP Server for OpenVMS is a nonprivileged, user-mode, socket-based network application. TMPMBX and NETMBX are the only privilege requirements. The server runs under its own unique UIC and user account (oracle).

H.4.1 Process Model

Oracle HTTP Server runs as a single job that consists of:

- One master process (oracle)
- Several subprocesses

Subprocesses are created to service incoming HTTP requests and to run CGI scripts.
Because the server runs as a single job, the OpenVMS security profile for each process is identical and no enhanced mechanism is required for these processes to communicate with one another. Resource utilization is controlled by a single user account (oracle) where pooled quotas are defined.

H.4.2 Privileged Images

Oracle HTTP Server performs three operations that require additional privileges:

- Binding to a port below 1024 (privileged ports)
  By default, the server binds to port 8080 (HTTP).

- Fetching path information for other users
  The server provides a replacement for the getpwnam C RTL routine to enable the server to fetch default path information for other users (required by MOD_UTIL and MOD_USERDIR).

- Changing the carriage-control attribute on socket (BG) devices
  The server also enables or disables (or both) the carriage-control attribute on BG (socket) devices for certain stream operations.

Two protected, shareable images are installed at startup to enable the server to perform the following functions:

- APACHE$PRIVILEGED.EXE (exec-mode services)
- APACHE$FIXBG.EXE (kernel-mode services)

The APACHE$PRIVILEGED.EXE image provides exec-mode services for binding to privileged sockets and fetching user default path information. Access to these services is limited to processes running under the oracle username and is controlled by the APACHE$PLV_ENABLE_APACHE$WWW logical name. This logical name is defined as:

*APACHE$PLV_ENABLE_APACHE$WWW* = *3,80,1023*

The *"3,80,1023"* string represents three parameters where:

- The first parameter (3) is a bit-mask that enables or disables the two services:
  - Binding to privileged ports
  - Fetching user default path information

- The second and third parameters indicate the minimum and maximum port that are allowed to be bound.

When a call to either service is made, the service code does the following:

1. Temporarily enables the SYSPRV, OPER, SYSNAM, and NETMBX privileges
2. Performs the function
3. Restores the process original privileges

The APACHE$FIXBG.EXE image provides a kernel-mode service for manipulating the carriage-control attribute for BG devices that are owned by the calling process. No special access control exists on this service. This function can also be performed using a setsockopt C RTL run-time call, but it is not supported by all TCP/IP stack vendors, which is the reason this service exists. This service does not enable privileges, but runs in kernel mode.
H.4.3 Privileges Required to Start and Stop the Server

Oracle HTTP Server runs under the oracle username and UIC and is started as a detached, network process. During startup, protected images are installed and logical names are placed in the system logical name table. Shutdown is accomplished by sending a KILL signal to the master process and its subprocess.

These actions require enhanced privileges (DETACH, SYSNAM, WORLD, and so forth) and are usually performed from a suitably privileged account.

H.4.4 File Ownership and Protection

All the server files reside under the root directories that the APACHE$ROOT logical name points to. During installation, file protection is set to (S:RWED, O:RWED, G, W). During configuration, all files are set to be owned by the oracle user.

H.4.5 Server Extensions (CGI Scripts)

Server extensions, such as CGI scripts, run within the context of Oracle HTTP Server process or its subprocesses. These extensions have complete control over the server environment. You can configure the server to enable processing of arbitrary user scripts, but standard practice is to limit such activity to scripts that are written by completely trusted users. Oracle HTTP Server includes directives that enable a Web administrator to control script execution and client access. The use of these directives is described in numerous books and is not duplicated here.

H.4.6 suEXEC Not Available for Protecting Script Execution

Oracle HTTP Server for OpenVMS does not currently support the suEXEC method of running scripts under the username that owns the script. Many sites use this feature to allow execution of arbitrary, user-written scripts without the fear of compromising the server environment.

H.5 Open Source Licenses

This section provides open source license acknowledgments and license references.

H.5.1 Apache

This product includes software developed by the Apache Software Foundation. You can visit the Web site of this organization at

http://www.apache.org/

You can view the license at the following Web site

http://h71000.www7.hp.com/openvms/products/ips/apache/apache_license.txt

This product also includes software that is developed by Hewlett-Packard.
The following set of commands can be used to display information about all listener processes:

```bash
found_any = 0
say = "write sys$output"

say 'Collecting system information - please wait...."

First, get a list of all disk on this system

pipe show dev d/mount > sys$scratch:lsnrchk_devices.tmp

close/nolog flsnr
open/read flsnr sys$scratch:lsnrchk_devices.tmp

Skip the records we know we don't need

read flsnr record
read flsnr record
read flsnr record

Loop on each disk we found

loop:
read flsnr/end=done_it record
dev = f$element(0," ", record)

Look for any processes accessing tnslsnr.exe

pipe show device/files 'dev' | search/nowarn -
   sys$input tnslsnr > sys$scratch:lsnr_chk1.tmp

If we found something, check the process(es) returned

if $status .eqs. "%X10000001"
then
   close/nolog tmp
   open/read tmp sys$scratch:lsnr_chk1.tmp
loop1:
   read/end=done_it_1 tmp record
```
$\text{if record .nes. ""}$
$\text{then}$
$\text{record = f$edit(record,'COMPRESS,TRIM,UPCASE')}$
$\text{Skip tnslsnr.com records}$
$\text{if f$locate('.COM;',record) .ne. f$length(record) then goto loop1}$
$\text{proc = f$element(1,' ',record)}$
$\text{! Skip tnslsnr.com records}$
$\text{if f$locate('.COM;',proc) .eq. f$length(proc) then}$
$\text{img = f$getjpi('''proc''','IMAGNAME')}$
$\text{lsnr_loc = f$extract(0,f$locate('.]',img),img)}$
$\text{lsnr_loc = f$extract(0,f$locate('.NETCONFIG]',lsnr_loc),lsnr_loc)}$
$\text{lsnr_loc = lsnr_loc + '.NETWORK.ADMIN']}$
$\text{prcnm = f$getjpi('''proc''','PRCNAM')}$
$\text{Display the result}$
$\text{if proc .nes. '' .and. f$locate('.EXE',proc) .eq. f$length(proc) then}$
$\text{img = f$getjpi('''proc''','IMAGNAME')}$
$\text{lsnr_loc = f$extract(0,f$locate('.]',img),img)}$
$\text{lsnr_loc = f$extract(0,f$locate('.NETCONFIG]',lsnr_loc),lsnr_loc)}$
$\text{lsnr_loc = lsnr_loc + '.NETWORK.ADMIN']}$
$\text{prcnm = f$getjpi('''proc''','PRCNAM')}$
$\text{Display the result}$
$\text{if found_any .eq. 0 then}$
$\text{say ""}$
$\text{say " The following listener(s) need to be checked :"}$
$\text{say ""}$
$\text{say " If they use the IPC Protocol with (key = EXTPROC) and/or "}$
$\text{say " the TCP Protocol with (Port = 1521) then they need to "}$
$\text{say " be shutdown when installing Oracle 10g"}$
$\text{say ""}$
$\text{endif}$
$\text{say ""}$
$\text{say " Listener process name : 'prcnm''}$
$\text{say " VMS pid : 'proc'}$
$\text{say " Probable LISTENER.ORA location : 'lsnr_loc''}$
$\text{found_any = found_any + 1}$
$\text{endif}$
$\text{goto loop1}$
$\text{endif}$
$\text{done_it_1:}$
$\text{close/nolog sys$scratch:lsnr_chk1.tmp}$
$\text{endif}$
$\text{goto loop}$
$\text{!}$
$\text{done_it:}$
$\text{close/nolog tnsnr}$
$\text{! Remove all work files}$
$\text{!}$
$\text{delete/noconfirm sys$scratch:lsnrchk_devices.tmp;*}$
$\text{delete/noconfirm sys$scratch:lsnr chk1.tmp;*}$
$\text{!}$
$\text{if found_any .eq. 0 then}$
$\text{say ""}$
$\text{say " No active SQL*Net Listeners detected on this node"}$
$\text{say ""}$
$\text{else}$
$\text{say ""}$
$\text{say ""}$
$\text{say ""}$
$\text{say ""}$
$\text{endif}$
$\text{!}$
$ say 'End of processing'
$ say ''
$ exit
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