



CHAPTER 4

Preparing the External Database

This chapter describes the procedures to configure external Oracle database for use with Prime Network. For a full description of an Oracle installation and to be sure you have the most recent documentation, see the documentation that came with your Oracle software or see the Oracle Corporation website.

Before You Begin

Before you attempt to install Oracle, note the following recommendations:

- For deployment information and recommendations, such as supported configurations and system sizing, contact your Cisco account representative.
- The Oracle server can be installed on the Cisco Prime Network gateway or on any other remote workstation.
- Cisco Prime Network does not manage the starting and stopping of Oracle processes. Although the customer can back up and restore the Oracle database, the database administrator is responsible for automatically restarting Oracle processes in the event of a power failure.
- If an Oracle server is installed on the Cisco Prime Network gateway, no Oracle services can be installed on port 2100. If an Oracle listener is installed on port 2100, you must disable it or change the port number (see Step 8 in [Table 4-2](#) for disabling the database components). By default, this port is used by the Oracle XML DB service.
- With the exception of NETWORK ADMIN, Prime Network tablespace data files are generated in 1 GB sizes with autoextend set to 256 MB and no size limit. (The data file can grow to 32 GB.) It is recommended that you preallocate the database storage by creating all required data files to their full sizes in advance.
- It is recommended that the Oracle user be called *oracle*, and that it be part of a group called *dba*.
- The database username and password that are related to the Cisco Prime Network application are created automatically during installation.
- In Cisco Prime Network, the clocks on the gateway and units must be synchronized. If Oracle is running on a separate workstation, that remote database workstation's clock must be synchronized with the gateway and unit clocks.
- If you restart Oracle, you must also restart AVM 25 on both the gateway and unit.
- If your system is configured for gateway high availability, you should start and stop Prime Network and Oracle using the Veritas Cluster Manager application (or CLI commands). Stopping the applications using the regular application commands (without the awareness of the cluster software) can cause a failover.

Creating an Oracle Database

The database instance installation can be performed as part of the Oracle installation or separately using the database configuration assistant (DBCA) utility. This section describes how to create an Oracle database instance using the DBCA utility which is located in `ORACLEHOME/bin` (where `ORACLEHOME` is the Oracle installation directory).

Download the Oracle patches from <http://metalink.oracle.com>.

**Note**

After installing an Oracle patch, you must change the permissions for the newly installed files to enable all OS users to use Oracle on the workstation. You can do this by running the script `ORACLEHOME\install\changePerm.sh`.

The Prime Network database size is determined by the usage patterns and the expected load in your deployment. Contact your Cisco account representative to obtain the *Cisco Prime Network Capacity Planning Guide*, which helps you identify your database load profile and calculate your database memory and storage size requirements.

Prime Network provides sizing estimates for the following usage profiles, which vary according to the maximum expected rate of actionable events per second that your deployment can support:

- Up to 250—Represents a high-scale production environment with a maximum supported rate of database operations, including up to 250 actionable events per second, a maximum amount of services, and the highest rate of configuration archive and provisioning operations.
- Up to 200—Represents a high-scale production environment with a maximum supported rate of database operations, including up to 200 actionable events per second, a maximum amount of services, and the highest rate of configuration archive and provisioning operations.
- Up to 100—Represents a high-scale production environment with a maximum supported rate of database operations, including up to 100 actionable events per second, a maximum amount of services, and the highest rate of configuration archive and provisioning operations.
- Up to 50—Represents a medium- to high-scale production environment with a medium rate of database operations, including up to 50 actionable events per second, a medium amount of services, and a medium rate of configuration archive and provisioning operations.
- Up to 20—Represents a medium- to small-scale production environment with a low rate of database operations, including up to 20 actionable events per second, a small amount of services, and a low rate of configuration archive and provisioning operations.
- Up to 5—Represents a small environment with a low rate of database operations, including up to 5 actionable events per second, a small amount of services, and a low rate of configuration archive and provisioning operations.
- Up to 1—Represents a very small test or proof-of-concept environment with a single machine acting as a gateway, unit, and database (or with a separate unit), with no more than 50 VNEs and a low rate of events.

When installing a database instance, use the values in [Table 4-1](#) for the Oracle initialization parameters (for both Oracle 10g and Oracle 11g). The values are in bytes.

Table 4-1 Database Initialization Parameters

Profile Name	Up to 5 Actionable Events per Second	Up to 20 Actionable Events per Second	Up to 50 Actionable Events per Second	Up to 100 Actionable Events per Second	Up to 200 - 250 Actionable Events per Second
sga_max_size	4412407808	6509559808	6509559808	10301210624	10301210624
shared_pool_size	1258291200	2147483648	2147483648	2147483648	2147483648
large_pool_size	134217728	134217728	134217728	134217728	134217728
java_pool_size	218103808	335544320	335544320	335544320	335544320
pga_aggregate_target	1048576000	1887436800	1887436800	1887436800	1887436800
sga_target	0	0	0	0	0
memory_target	0	0	0	0	0
memory_max_target	0	0	0	0	0
db_cache_size	1048576000	2684354560	2684354560	2684354560	2684354560
db_keep_cache_size	318767104	872415232	872415232	3690987520	3690987520
db_recycle_cache_size	167772160	167772160	167772160	838860800	838860800
db_file_multiblock_read_count	16	16	16	16	16
open_cursors	2000	2000	2000	2000	2000
optimizer_index_cost_adj	10	10	10	10	10
optimizer_index_caching	50	50	50	50	50



Note

You can use two databases for the Prime Network system events and data and for the raw events. The Oracle SIDs used to store Prime Network system data and raw events can exist on separate Oracle instances.

For better performance, make sure you generate statistics for all tables in the database. Cisco Prime Network issues alerts if no statistics are generated, or if the current statistics are more than two weeks old.



Note

The *pn user_admin* user is a user with database administrator permissions who can run maintenance tasks—such as gathering statistics—on the other Prime Network database schemas. After the *pn user_admin* user is created, a cron job runs every 24 hours to gather statistics on *pn user* and *pn user_EP* tables. You no longer have to gather statistics manually.

If you expect a high scale in the first 24 hours, it might be necessary to manually force statistics gathering twice during the first day, 1 and 5 hours after noise start. To force statistics gathering, enter the following command as the *pn user* (where *pn user* is the operating system user account for the Prime Network application, created when Prime Network is installed):

```
cd $ANAHOME/Main/scripts ; ./call_update_ana_stats.pl >& /dev/null
```

Table 4-2 describes the steps involved in creating an Oracle 10g or Oracle 11g database using DBCA.

Table 4-2 *Creating an Oracle database Using DBCA*

	Procedure	Recommended Action
Step 1	In the Operations window, select the operation that you want to perform.	Choose Create a Database .
Step 2	In the Database Template window, select the template.	Choose Custom Database .
Step 3	In the Database Identification window, enter the Global Database Name and SID field.	Enter mcdb.
Step 4	In the Management Options window, configure the fields in Enterprise Manager as required.	Do not set any of the fields in Enterprise Manager and Automatic Maintenance task, and proceed to the next step.
Step 5	Enter the passwords for the Oracle administrative accounts	Enter password such as SYS and SYSTEM.
Step 6	In Database File Locations window, specify the storage type and location for the database.	<ul style="list-style-type: none"> a. Select Storage Type as File System. b. For Storage Location, browse for the common location for all database files (Example: /export/home/oracle/oradata/mcdb)
Step 7	<p>In Recovery Configuration window, configure the database recovery options.</p> <p>Note Prime Network does not require you to enable archiving. This option is required only for backing up and restoring the database.</p>	<ul style="list-style-type: none"> a. Check Enable Archiving to enable the archiving feature. <p>Note If a Flash Recovery Area was specified by the database administrator, the archive logs go there; otherwise, any other specified archive log destinations are used. It is recommended that archive log files be written to multiple locations spread across different disks.</p> <ul style="list-style-type: none"> b. Click Edit Archive Mode Parameters to display the Edit Archive Mode Parameters dialog box. c. Check Automatic Archiving. d. In the Archive Log File Format field, specify the archive log filename format. e. Specify the destination directories that are to contain the archive logs. (Example: /export/home/oracle/arch) f. Click OK.

Table 4-2 Creating an Oracle database Using DBCA (continued)

	Procedure	Recommended Action
Step 8	In the Database Content window, select the components you want to configure for use in your database.	<p>Here it is recommended that you disable all database components and remove the Oracle XML DB service in the Standard Database Components window.</p> <ol style="list-style-type: none"> In the Database Component tab, deselect all database components. Click Standard Database Components to display Standard Database Components dialog box. Uncheck the Oracle XML DB check box, then click OK. <p>Note When you uncheck the Oracle XML DB, an alert message pops up indicating that you cannot use these XML packages and components in your database. Click Yes to proceed.</p>
Step 9	In the Initialization Parameters window, configure the memory settings for the database.	<ol style="list-style-type: none"> Select Custom. For the Memory Management field, select the Manual Shared Memory Management from the drop down. Configure other initialization parameters. Refer Table 4-1 for the values of various database initialization parameters based on profiles.
Step 10	<p>In the Database Storage window, configure the Redo Log settings for an Oracle 10g or Oracle 11g installation.</p> <p>Note To support high event rates, redo log files must be six online 2 GB files on raw devices or on a dedicated disk partition mounted with the directio option. The redo log files must reside on a physical disk separate from the Oracle data files. In Oracle 11.2, the Oracle installer and DBCA do not support raw/block devices for database files (see Oracle note 754305.1).</p>	Contact your Cisco account representative to estimate the database size. The representative can provide the Memory Assessment Tool to help you with the database sizing.
Step 11	In the Creation Options window select the database creation options.	Choose Create Database .

Configuring Database

This section includes details on configuring database, such as configuring the Oracle initialization parameters, changing ports, configuring database size and so on.

Configuring the cursor_sharing System Parameter

The cursor_sharing system parameter must be set to FORCE.

To configure the cursor_sharing system parameter:

Step 1 As the SYS user, enter the following command:

```
ALTER SYSTEM SET cursor_sharing='FORCE' SCOPE=BOTH;
```

Step 2 Enter the following SQL*PLUS command to verify that the parameter is set correctly:

```
SQL> show parameter cursor_sharing
```

In the command output, you should see:

NAME	TYPE	VALUE
-----	-----	-----
cursor_sharing	string	FORCE

Retaining Oracle 11.2.0.2 Behavior

To ensure that Oracle 11.2.0.2 behavior is retained, ensure that the partitions are created with an extent size of 64 KB. To create partitions with extent size of 64 KB, set the hidden parameter (_partition_large_extents) to false.

Enter the following command as the SYS user:

```
ALTER SYSTEM SET "_partition_large_extents" =FALSE SCOPE=BOTH;
```

**Note**

The Oracle 11.2.0.2 behavior is not retained if the partitions are created with the default extent size (8 MB).

Configuring the job_queue_processes System Parameter

Job_queue_Processes specifies the maximum number of processes that can be created for the execution of jobs. The job_queue_processes system parameter must be set to 1000, which is the default on Oracle 11g.

To configure the job_queue_processes parameter:

Step 1 As the SYS user, enter the following command:

```
alter system set job_queue_processes=1000 scope=both;
```

Step 2 Enter the following SQL*PLUS command to verify that the parameter is set correctly:

```
SQL> show parameter job_queue_processes
```

In the command output, you should see:

NAME	TYPE	VALUE
-----	-----	-----
job_queue_processes	integer	1000

Configuring the audit_trail System Parameter

You must disable Oracle auditing by setting the audit_trail system parameter to NONE.

To configure the audit_trail system parameter:

Step 1 As the SYS user, enter the following command:

```
ALTER SYSTEM SET audit_trail=NONE SCOPE=spfile;
```

Step 2 As the SYS user, enter the following command to start the database:

```
Startup
```

Step 3 As the SYS user, enter the following SQL*PLUS command to verify that the parameter is set correctly:

```
SQL> show parameter audit_trail
```

In the command output, you should see:

NAME	TYPE	VALUE
-----	-----	-----
audit_trail	string	NONE

Disabling the Recycle Bin Option

If enabled, the Oracle recycle bin feature retains a version of each dropped object, which can lead to an accumulation of junk information in the Prime Network Manage DB Segments table.

To disable the recycle bin option:

Step 1 As the SYS user, enter one of the following commands, depending on your Oracle version:

- For Oracle 10g, enter:

```
ALTER SYSTEM SET recyclebin = OFF scope=both;
```

- For Oracle 11g, enter:

```
ALTER SYSTEM SET recyclebin = OFF DEFERRED scope=both;
```

Step 2 Enter the following SQL*PLUS command to verify that the parameter has been disabled:

```
SQL> show parameter recyclebin
```

In the command output, you should see:

NAME	TYPE	VALUE
-----	-----	-----
recyclebin	string	OFF DEFERRED

Step 3 (Optional) As the *pn user*, enter the following command to see the objects that are currently saved in the recycle bin:

```
show recyclebin
```

Step 4 (Optional) As the *pn user*, enter the following command to empty the recycle bin:

```
purge recyclebin;
```

Setting the open_cursors Parameter

Open cursors enable the reading and writing of data between the Oracle database and Cisco Prime Network. The `open_cursors` parameter defines the maximum number of cursors that can be opened concurrently, per session. The recommended maximum number of open cursors for use with Cisco Prime Network is 2000. An error is generated if the number of open cursors in a session exceeds the specified number.

To set the `open_cursors` parameter:

Step 1 To check the value of the `open_cursors` parameter, enter:

```
SQL> show parameter open_cursors
```

In the command output, you should see:

```
open_cursors integer 2000
```

Step 2 If the integer value is less than 2000, enter:

```
SQL> ALTER SYSTEM SET open_cursors = 2000 SCOPE=BOTH;
```

Step 3 To verify that the value has changed, enter:

```
SQL> show parameter open_cursors
```



Note

If the `open_cursors` integer value is still less than 2000, contact your local database administrator.

Disabling Automatic Maintenance Jobs in Oracle 10g and 11g

If you deploy Prime Network to handle a high event rate, it is recommended that you disable Oracle's automatic maintenance jobs. Automatic maintenance significantly affects Oracle performance and increases event processing time.

**Caution**

The following procedure disables *all* scheduler maintenance activities. Complete the following procedure after implementing an alternative method of gathering database statistics. Some of the commands will fail in some versions of Oracle; you can ignore any failures.

Step 1 Connect to the Oracle database as the SYS user and enter the following commands:

```
execute DBMS_SCHEDULER.disable (name => 'GATHER_STATS_PROG',force => TRUE);
execute DBMS_SCHEDULER.disable (name => 'AUTO_SPACE_ADVISOR_PROG',force => TRUE);
execute dbms_scheduler.disable(name =>'GATHER_STATS_JOB',force => TRUE);
execute dbms_scheduler.disable(name =>'BSLN_MAINTAIN_STATS_JOB',force => TRUE);
execute DBMS_SCHEDULER.disable(name => 'SYS.MAINTENANCE_WINDOW_GROUP', force => TRUE);
execute DBMS_SCHEDULER.disable(name => 'SYS.ORA$AT_WGRP_SA', force => TRUE);
execute DBMS_SCHEDULER.disable(name => 'SYS.ORA$AT_WGRP_SQ', force => TRUE);
execute DBMS_SCHEDULER.disable(name => 'SYS.ORA$AT_WGRP_OS', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.MONDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.TUESDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.WEDNESDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.THURSDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.FRIDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.SATURDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.SUNDAY_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.WEekNIGHT_WINDOW', force => TRUE);
EXECUTE DBMS_SCHEDULER.disable (name =>'SYS.WEEKEND_WINDOW', force => TRUE);
```

Changing Database Ports

If Oracle is installed on the Cisco Prime Network gateway, no Oracle services can be installed on port 2100. If an Oracle listener was installed on port 2100, you must disable it or change the port number. By default, this port is used by the Oracle XML DB service.

**Note**

You must change the FTP port number if an Oracle listener was installed by default on port 2100.

Use this procedure to change the port numbers of the XML DB listeners, if required.

This procedure applies only if you installed the Oracle XML DB service. If you disabled the Oracle XML DB service, skip this section.

Step 1 To log into Oracle SQL, enter:

```
sqlplus user/password
```

Step 2 To change the HTTP port from 8080 to 8083, enter:

```
sql> call dbms_xdb.cfg_update(updateXML(dbms_xdb.cfg_get(),
'/xdbconfig/sysconfig/protocolconfig/httpconfig/http-port/text()', 8083));
```

Step 3 To change the FTP port from 2100 to 2111, enter:

```
sql> call dbms_xdb.cfg_update(updateXML( dbms_xdb.cfg_get(),
'/xdbconfig/sysconfig/protocolconfig/ftpconfig/ftp-port/text()' , 2111));
```

Step 4 To commit the update, enter:

```
sql> COMMIT;
```

Step 5 To refresh the settings, enter:

```
sql> exec dbms_xdb.cfg_refresh
```

Step 6 To exit SQL Command Line, enter:

```
sql> exit
```

Configuring the Database Size

This section explains how to determine the size of the database and the amount of data files to use. Topics include:

- [Defining the Data Files in the Database, page 4-10](#)
- [Recommended Disk Structure, page 4-10](#)

Defining the Data Files in the Database

The size of the stored data is determined mainly by the number of stored events. By default, Cisco Prime Network is configured to archive events for up to 14 days. The archive size, the supported event rates, and the average event size dictate the expected database growth on a daily basis. Contact your Cisco account representative to obtain the *Cisco Prime Network Capacity Planning Guide*, which helps you make your sizing calculations.

Events that are archived for a long time cause a significant load on the database and require additional disk space. Prime Network 3.10 uses database schemas based on the username configured during installation (*pn user* and *pn user_ep*), which are each partitioned with a separate process. You can configure the partitions for the *pn user* scheme from the Prime Network GUI, but you should consult the Cisco Technical Assistance Center (TAC) first. You cannot configure the partitions for the *networ-user_ep* scheme from the GUI. For information on using registry commands to configure the partitions for the *pn user_ep* scheme, consult the Cisco TAC and see the [Cisco Prime Network 3.10 Administrator Guide](#).

Recommended Disk Structure

The recommended disk structure for an Oracle server based on the number of disks that the server holds:

- Oracle data files—The optimal location is an external disk array (preferably RAID 10).
- Online redo log files—The optimal location is an internal disk partition mounted with the **directio** option. The redo log files should not reside on the same disk as the data files.
- Archive files—Should not reside on the same disk as the data files.
- Backup files—Should not reside on the same disk as the data files.

Configuring Oracle to Start Automatically When Prime Network Restarts

By default, the Oracle application does not start automatically when Prime Network is rebooted. This is because the best practice is for the system database administrator to manually start the database in a controlled environment. However, if you want Oracle to start when the system is rebooted, there are multiple ways to accomplish this task. The following is one example; see the Oracle documentation for other implementations.

As the Oracle UNIX root user, create a file in the `/etc/rc2.d` directory named `S99OracleDB`, with the following contents:

```
ORA_OWNER=oracle
DBLOG=$INSTALL_DIR/log/dbop.log
TZ=GMT
if [ -f /var/opt/oracle/oratab ]; then
    orahome=`grep -v "^#" /var/opt/oracle/oratab | grep . | sed -ne 'lp' | awk -F: '{print $2}'`
else
    echo "/var/opt/oracle/oratab file doesn't exist. Please check if Oracle is installed "
>> $DBLOG
    echo "dbora $1 aborted..." >> $DBLOG
    exit
fi
ORA_HOME=$orahome
TNS_ADMIN=$ORA_HOME/network/admin
if [ ! -f $ORA_HOME/bin/dbstart -o ! -d $ORA_HOME ]
then
echo "Oracle startup cannot start"
exit
fi

if [ ! -d $INSTALL_DIR/log ]; then
    mkdir $INSTALL_DIR/log
    chmod 777 $INSTALL_DIR/log
fi
if [ ! -f $DBLOG ]; then
    touch $DBLOG
fi

#start the Oracle databases
echo "Invoking dbstart at `date` " >> $DBLOG
echo >> $DBLOG
su - $ORA_OWNER -c $ORA_HOME/bin/dbstart
echo "Invoking Listener start at `date`" >> $DBLOG
echo >> $DBLOG
su - $ORA_OWNER -c "lsnrctl start"
echo "Listener started." >> $DBLOG
echo >> $DBLOG
```

Password Settings in the Default Profile

When you create a database in Oracle Database 11g, passwords of users belonging to the default profile expire after 180 days. Because Cisco Prime Network database users receive the default profile, their database password will expire after 180 days. To prevent this from occurring, complete the following steps:

Step 1 Log into the Oracle SQL as the sysdba.

Step 2 Enter:

```
alter profile default limit PASSWORD_LIFE_TIME unlimited;
```

Maintaining the Database

After database installation, maintaining the database can involve:

- [Maintaining Archive Log File Disk Space](#)—Ensure that there is sufficient space on a disk to store a large volume of archive logs caused by the large number of Cisco Prime Network updates to the database.
- [Adding Data Files to the Tablespace](#)—Add data files to enable the storage of event history logs for a longer period of time.



Note

Refer to your Oracle documentation for instructions on how to back up the Oracle software.

Maintaining Archive Log File Disk Space

The large number of Prime Network updates to the database causes the size of the archive log to expand rapidly and consume a large amount of space on the disk partition. To maintain space on the disk partition, an Oracle database administrator should delete the archive log files periodically.

Adding Data Files to the Tablespace

After you install Cisco Prime Network and its database, you might need to add more data files, depending on the event rate per second. Here is an example showing how to add a data file to the existing tablespace for Oracle 10g or Oracle 11g:

```
alter tablespace tablespace-name add datafile 'new-data-file-full-path' size 32G
autoextend off;
```

where *tablespace-name* is NETWORK_TABLESPACE, DWE_TABLESPACE, or EP_TABLESPACE.

The size can be changed and is subject to actual needs and availability.



Note

With the exception of NETWORK ADMIN, Prime Network tablespace data files are generated in 1 GB sizes with autoextend set to 256 MB and no size limit. (The data file can grow to 32 GB.) It is recommended that you preallocate the database storage by creating all required data files to their full sizes in advance.
