Creating and Configuring an Oracle Database

This chapter provides specific guidelines for creating and configuring an Oracle database for use with Cisco ANA. 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.

This chapter includes:

• Before You Begin, page 4-1
• Creating an Oracle Database, page 4-2
• Changing XML DB Ports, page 4-11
• Configuring the Database Size, page 4-12
• Setting the open_cursors Parameter, page 4-13
• Starting the Oracle Listener, page 4-13
• Maintaining the Database, page 4-14
• Using Chinese Characters with Cisco ANA, page 4-15

Before You Begin

Before starting the Cisco ANA installation, one of the following Oracle versions must be installed:

• Oracle 10g Enterprise Edition Release 10.2.0.3.0 or later, with the Oracle JVM and partitioning options.

• Oracle 11g Enterprise Edition Release 11.2.0.1.0 or later, with the Oracle JVM and partitioning options. For Oracle 11.2.0.1.0, the following patches are required:
  – For Solaris: p9120088_112010_SOLARIS64.zip
  – For Linux: p9120088_112010_Linux-x86-64.zip

Before you attempt to install Oracle, note the following:

• 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 ANA gateway or on any other remote workstation.

• Cisco ANA 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.
Creating an Oracle Database

If an Oracle server is installed on the Cisco ANA 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 Disabling Database Features, page 4-3). By default, this port is used by the Oracle XML DB service.

It is recommended that the Oracle user be called oracle, and that it be part of a group called dba.

The recommended Oracle 10g for Cisco ANA 3.7 is the 64-bit version with patch 10.2.0.3.0. This version is installed by executing .runInstaller.

The database username and password that are related to the Cisco ANA application are created automatically during installation.

In Cisco ANA, 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.

Download Location

Download the Oracle 10.2.0.3.0 patch (patchset 5337014) from http://metalink.oracle.com.

Note

After installing patch 10.2.0.3.0, 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 $ORACLE_HOME/install/changePerm.sh.

Creating an Oracle Database

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

When installing a database instance, use the following System Global Area (SGA) and buffer cache sizes:

- Oracle 10g—Set SGA_TARGET to 3700M, PGA_AGGREGATE_TARGET to 921M
- Oracle 11g—Set MEMORY_TARGET to 4608M

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

Table 4-1 describes the steps involved in creating an Oracle 10g or Oracle 11g database using DBCA.

<table>
<thead>
<tr>
<th>DBCA Install UI</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Configuration Assistant: Operations</td>
<td>Choose <strong>Create a Database</strong>.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Database Templates</td>
<td>Choose <strong>Custom Database</strong>.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Database Identification</td>
<td>• In the Global Database Name field, enter the database name. &lt;br&gt; • In the SID field, enter the Oracle system identifier.</td>
</tr>
</tbody>
</table>
Creating an Oracle Database

Disabling Database Features

The Database Configuration Assistant wizard guides you step-by-step through the Oracle database installation. When you are prompted to select the components to configure for use in the database, it is recommended that you disable all database components and remove the Oracle XML DB service.

Figure 4-1 shows the dialog box that lets you disable database components.

Figure 4-1 Disabling Database Components

<table>
<thead>
<tr>
<th>Database Configuration Assistant: Management Options</th>
<th>Retain the default selections.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Configuration Assistant: Database Credentials</td>
<td>Enter the passwords for the Oracle administrative accounts such as SYS and SYSTEM.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Storage Options</td>
<td>Choose <strong>File System</strong>.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Database File Locations</td>
<td>Retain the default selections.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Recovery Configuration</td>
<td>See Archiving Logs for Oracle, page 4-7.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Database Content</td>
<td>See Disabling Database Features, page 4-3.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Initialization Parameters</td>
<td>See Configuring Memory Settings, page 4-6.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Database Storage</td>
<td>See Configuring Database Storage (Redo Logs), page 4-9.</td>
</tr>
<tr>
<td>Database Configuration Assistant: Creation Options</td>
<td>Choose <strong>Create Database</strong>.</td>
</tr>
</tbody>
</table>
Disabling the Oracle XML DB Service for an Oracle 10g or Oracle 11g Installation

The following procedure describes how to disable the Oracle XML DB service during the database creation for Oracle 10g and Oracle 11g installations.

**Step 1** In the Database Configuration Assistant wizard, click **Standard Database Components** (see Figure 4-1). The Standard Database Components dialog box (Figure 4-2) opens, asking you to select the standard database components to configure for use in your database.

![Figure 4-2 Disabling Oracle XML DB](image)

**Step 2** Uncheck the **Oracle XML DB** check box, then click **OK**.
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:

```sql
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
SQL> show parameter cursor_sharing
```

In the command output, you should see:

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>cursor_sharing</td>
<td>string</td>
<td>FORCE</td>
</tr>
</tbody>
</table>

Configuring the `job_queue_processes` System Parameter

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:

```sql
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
SQL> show parameter job_queue_processes
```

In the command output, you should see:

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>job_queue_processes</td>
<td>integer</td>
<td>1000</td>
</tr>
</tbody>
</table>

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:

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

**Step 2**  
As the SYS user, enter the following command to shut down the database:

```sql
Shutdown immediate
```
**Step 3**  As the SYS user, enter the following command to start the database:

```
Startup
```

**Step 4**  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:

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>audit_trail</td>
<td>string</td>
<td>NONE</td>
</tr>
</tbody>
</table>

---

### Configuring Memory Settings

Memory settings are configured in the Initialization Parameters panel of the Database Configuration Assistant wizard.

*Figure 4-3* shows the recommended memory settings for an Oracle 10g installation.

*Figure 4-3  Configuring Memory Settings for Oracle 10g*
Figure 4-4 shows the recommended memory settings for an Oracle 11g installation.

**Figure 4-4 Configuring Memory Settings for Oracle 11g**

Archiving the Database

The Database Configuration Assistant wizard lets you configure the settings required for archiving the database, including:

- Archiving Logs for Oracle, page 4-7
- Configuring Database Storage (Redo Logs), page 4-9

Archiving Logs for Oracle

In the Recovery Configuration panel (Figure 4-5) in the Database Configuration Assistant wizard, you can configure the settings for recovering the database logs for an Oracle 10g or Oracle 11g installation.
Note

Cisco ANA does not require you to enable Flash Recovery Area. You can enable this feature if you think it might be useful.

To configure the database recovery options:

Step 1  Check **Enable Archiving** to enable the archiving feature, then click **Edit Archive Mode Parameters**. The Edit Archive Mode Parameters dialog box opens (Figure 4-6).
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Creating an Oracle Database

Figure 4-6  Edit Archive Mode Parameters

Step 2  Check **Automatic Archiving**.

Step 3  In the Archive Log File Format field, specify the archive log filename format.

Step 4  Specify the destination directories that are to contain the archive logs.

Step 5  Click **OK**.

**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.

Configuring Database Storage (Redo Logs)

In the Database Storage panel in the Database Configuration Assistant wizard, you can configure the Redo Log settings for an Oracle 10g or Oracle 11g installation, as shown in Figure 4-7.

**Note**  The redo logs must be three 1-GB files on raw devices, and must reside on a physical disk separate from the Oracle data files.
Disabling Automatic Maintenance Jobs

If you deploy Cisco ANA 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.

Disabling Automatic Maintenance in Oracle 10g

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

```sql
exec dbms_scheduler.disable('GATHER_STATS_JOB');
exec dbms_scheduler.disable('AUTO_SPACE_ADVISOR_JOB');
```

Step 2  After the system has been running for several days, the database administrator should gather database statistics to tune Oracle performance for Cisco ANA operations. Because this step might affect performance, complete it while the system is idle. Enter the following commands as the SYS user:

```sql
exec dbms_scheduler.enable('GATHER_STATS_JOB');
exec dbms_stats.gather_schema_stats(ownname=> 'XXX',options=> 'GATHER AUTO',estimate_percent=>1,method_opt=>'FOR ALL INDEXED COLUMNS SIZE 1');
exec dbms_scheduler.disable('GATHER_STATS_JOB');
```

where ‘XXX’ is the database owner.
Disabling Automatic Maintenance in Oracle 11g

**Step 1** Connect to the Oracle database as the SYS user and enter the following command to disable the BSLN_MAINTAIN_STATS_JOB:

```sql
debms_scheduler.disable('BSLN_MAINTAIN_STATS_JOB');
```

**Step 2** After the system has been running for several days, the database administrator should gather database statistics to tune Oracle performance for Cisco ANA operations. Because this step might affect performance, complete it while the system is idle. Enter the following command as the SYS user:

```sql
debms_stats.gather_schema_stats(ownname=> 'XXX',options=> 'GATHER AUTO',estimate_percent=>1,method_opt=>'FOR ALL INDEXED COLUMNS SIZE 1');
```

where ‘XXX’ is the database owner.

---

Changing XML DB Ports

If Oracle is installed on the Cisco ANA 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 as shown in Figure 4-2, skip this section.

**Step 1** To log into Oracle SQL, enter:

```sql
sqlplus user/password
```

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

```sql
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
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
sql> COMMIT;
```

**Step 5** To refresh the settings, enter:

```sql
sql> exec dbms_xdb.cfg_refresh
```
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Configuring the Database Size

This section describes how to specify the size of the database, depending on the length of time required to store historical events. Topics include:

- Defining the Data Files in the Database, page 4-12
- Recommended Disk Structure, page 4-12

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 ANA 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 understand the supported event rates and the estimated size of the database.

Events that are archived for a long time cause a significant load on the database and require additional disk space. Cisco ANA 3.7 uses two database schemas based on the username configured during installation (ana-user and ana-user_EP), which are each partitioned with a separate process. You can configure the partitions for the ana-user scheme from the Cisco ANA GUI; you cannot configure the partitions for the ana-user_EP scheme from the GUI. Use the following registry commands to configure the partitions for the ana-user scheme:

```bash
./runRegTool.sh -gs 127.0.0.1 set 0.0.0.0 trap/agents/trap/partitioning/historySizeInDays 14
./runRegTool.sh -gs 127.0.0.1 set 0.0.0.0 trap/agents/trap/partitioning/partitionSizeInDays 2
```

Note

- The two hard disks of the gateway are limited to a maximum of 64 GB for database data files. The remaining space is needed for OS swap, backup and restore procedures, and database archive logs. To utilize the full hard disk size of 146 GB, external storage must be used.
- The maximum size of a data file for Oracle 10g or Oracle 11g 8 KB block size is 32 TB; however, it is recommended that you limit it to 32 GB.

Recommended Disk Structure

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

- Disk 1 (146 GB): Approximately 40 GB should be used by OS files, and 100 GB can be used by two Oracle data files.
- Disk 2 should be used for redo logs and archiving, and not for Oracle data files.
- 3 or more disks (146 GB): Can be used by three Oracle data files.
Setting the open_cursors Parameter

Open cursors enable the reading and writing of data between the Oracle database and Cisco ANA. 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 ANA 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
SQL> show parameter open_cursors
```

The following output should be displayed:

```
open_cursors integer 2000
```

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

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

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

```sql
SQL> show parameter open_cursors
```

---

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

---

Starting the Oracle Listener

After the database has been created, the Oracle listener should be started to enable the `ana-conf.pl` configuration script to connect to the database.

To start the Oracle listener:

---

**Step 1**
To determine if the Oracle listener is up, enter:

```bash
ps -ef | grep ora
```

The following output should be displayed (if the ORACLE_HOME UNIX environment variable is set to `/export/home/oracle`):

```
oracle 17327  1  0  Aug 02 0 0:00 /export/home/oracle/product/10.2.0/bin/tnslsnr LISTENER -inherit
```
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 ANA 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**

For information about how to back up and restore the database, see the *Cisco Active Network Abstraction 3.7 Administrator Guide*.

Maintaining Archive Log File Disk Space

The large number of Cisco ANA 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 the Cisco ANA installation is complete and the database has been installed, you might need to add more data files, depending on the event rate per second.

To add a data file to the existing tablespace for Oracle 10g or Oracle 11g, enter:

```
alter tablespace tablespace-name add datafile 'new-data-file-full-path' size 1g autoextend on next 256M;
```

where `tablespace-name` is `ANA_TABLESPACE`, `DWE_TABLESPACE`, or `EP_TABLESPACE`.

**Note**

The Cisco ANA installation uses the following database schema names:

- `ana-user`—For the main node.
- `ana-user_EP`—For the Raw Event Archive node.
- `ana-user_DWE`—For the Workflow Engine node.
Using Chinese Characters with Cisco ANA

Cisco ANA NetworkVision lets you attach business tags to the following network objects to support traditional and simplified Chinese characters:

- Location
- Node name
- Router name
- Map aggregation

The following business tag functions support Chinese characters:

- Creating business tags for network objects
- Searching for business tags
- Generating a list of business tags
- Editing business tag details
- Removing business tags
- Exporting business tags through the northbound interface (NBI)
- Writing business tag notes

Complete the following sections to use Chinese characters with Cisco ANA.

Using Chinese Characters with Oracle

If you are using Chinese characters, make sure the database parameter NLS_CHARACTERSET is set to a value that supports UTF8. Otherwise, Chinese characters will not display correctly after you install or migrate to Cisco ANA 3.7.

**Note**

If you are using Oracle 10g, you probably need to change the NLS_CHARACTERSET value. If you are using Oracle 11g, the NLS_CHARACTERSET value is set to AL32UTF8 by default, so you probably do not need to change it.

---

Step 1  Stop Cisco ANA before changing the character set of your database.

Step 2  To check the value of the NLS_CHARACTERSET parameter, enter the following SQL*PLUS command:

```
sql> SELECT parameter, value FROM v$nls_parameters WHERE parameter='NLS_CHARACTERSET';
```

If the value is UTF8 or AL32UTF8, skip the remaining steps; no further action is required.

Step 3  Check the job_queue_processes and aq_tm_processes parameters and record the current values, which you will restore later in this procedure. Complete the following substeps:

a. To check the job_queue_processes value, enter the following command:

```
SQL> show parameter job_queue_processes
```

In the command output, you should see:

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>job_queue_processes</td>
<td>integer</td>
<td>10</td>
</tr>
</tbody>
</table>
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Using Chinese Characters with Cisco ANA

b. To check the aq_tm_processes value, enter the following command:

   SQL> show parameter aq_tm_processes

   In the command output, you should see:

   NAME                  TYPE        VALUE
   -----                 -----       -----
   aq_tm_processes       integer     0

Step 4  Use the Oracle CSALTER script to change the character set to UTF8 or AL32UTF8. The CSALTER script is part of the Oracle Database Character Set Scanner utility. Complete the following substeps to change the database character set. For details, see the Oracle Database Globalization Support Guide, section “Migrating a Character Set Using the CSALTER Script.”

   a. Use either a SHUTDOWN IMMEDIATE or a SHUTDOWN NORMAL statement to shut down the database.
   b. Perform a full backup of the database, because the CSALTER script cannot be rolled back.
   c. Start the database.
   d. Run the Oracle Database Character Set Scanner utility (the csscan script). The new character set must be UTF8 or AL32UTF8.
   e. Run the CSALTER script.
   f. Use either a SHUTDOWN IMMEDIATE or a SHUTDOWN NORMAL statement to shut down the database.
   g. Start the database.

Step 5  Enter the following commands to restore the values that you recorded in Step 3 for the job_queue_processes and aq_tm_processes parameters:

   sql> alter system set job_queue_processes=10 SCOPE=BOTH; # Enter the value from Step 3
   sql> alter system set aq_tm_processes=0 SCOPE=BOTH; # Enter the value from Step 3

Step 6  Start Cisco ANA.

Using Chinese Characters with Windows Clients

If you are using Chinese characters, the Windows client workstation where the Cisco ANA 3.7 client is installed must have East Asian languages installed. Also, the regional options must support Chinese.

Step 1  In the Windows Control Panel, choose Regional and Language Options.
Step 2  Click the Languages tab.
Step 3  Insert the Windows CD.
Step 4  Check the Install files for East Asian languages check box.
Step 5  Click OK.
Step 6  Reopen the Windows Control Panel and choose Regional and Language Options.
Step 7  Click the Regional Options tab.
Step 8  In the drop-down list, choose Chinese (PRC).
Step 9  Click OK.
Step 10  Restart your Windows client workstation.

Using Chinese Characters with Solaris

If you are using Chinese characters, make sure the Solaris environment variable LC_CTYPE is set to a value that supports UTF8. Otherwise, Chinese characters will not display correctly after you install or migrate to Cisco ANA 3.7.

Step 1 Using SSH, connect to the Cisco ANA gateway, switch to the ANA user, and enter the following commands:

```
su - ana-user
locale
```

The command output indicates whether the machine language (LC_CTYPE) uses UTF8.

- If the command output is UTF8, stop here; no further action is required.
- If the command output is not UTF8, enter the command `locale -a` and choose an option that uses UTF8 format; for example, `en_US.UTF-8`.

**Note** If the Solaris workstation does not have a UTF8 language package installed, refer to the Solaris documentation to install a UTF8 language package.

Step 2  Enter the following command:

```
vi ~/.cshrc
```

Step 3  Add the following line in the .cshrc file:

```
setenv LC_CTYPE language-option
```

For example, to use the `en_US.UTF-8` language option, enter:

```
setenv LC_CTYPE en_US.UTF-8
```

Step 4  Enter the following command to restart Cisco ANA 3.7:

```
anactl restart
```

Step 5  Use PuTTY to verify whether the BQL connection supports Chinese characters. PuTTY supports UTF-8 on Telnet and SSH connections.

a. Open PuTTY.
b. Choose **Windows > Translation > Character set**.
c. Select **UTF-8**.
d. Click **Open**.
e. Connect to the Cisco ANA server 9002 port and run BQL commands. Verify whether the commands display Chinese characters correctly.