Abstract
This guide contains configuration information for installing and managing an Oracle Database 12c for IMC on the Linux operating system.
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Overview

This guide describes the installation of Oracle Database 12c for IMC on Red Hat Enterprise Linux Server 6.4. If your installation of Oracle Database 12c uses a different version of Red Hat Enterprise Linux, see the Oracle database installation documents for your Linux version.

To achieve optimized performance of the system running the Oracle database, see Oracle Database Installation Guide and Oracle Database Quick Installation Guide at the Oracle website.
Preparing for installation

The following information describes the tasks you must complete in Linux as the root user before installing Oracle Database 12c.

To avoid installation errors, use the keyboard to type your entries rather than using cut-and-paste for user input.

The Oracle Database 12c server is supported only on 64-bit Linux, and the Oracle Database 12c client is supported on both 64-bit Linux and 32-bit Linux. For more information, see Oracle Database Installation Guide 12c Release 1 (12.1) for Linux.

Checking the required software packages

Before installing the Oracle database, make sure you have installed all required packages on the Linux operating system:

1. Identify all packages that are already installed on the system.
   
   ```
   rpm -qa
   ```

2. Determine whether a required software package has been installed.
   
   ```
   rpm -q
   ```

3. If a software package is missing, install the package:
   
   a. Copy the software package from the Linux installation CD to a local directory.
      
      On Red Hat Enterprise Linux 5, the software package is located in the Server directory of the installation CD.
      
      On Red Hat Enterprise Linux 6.x, the software package is located in the Packages directory of the installation CD.
      
   b. Install the package with or without a package dependency check.
      
      ```
      rpm -ivh xxx.rpm
      rpm -i --nodeps xxx.rpm
      ```
      
      The string `xxx.rpm` represents the name of the software package to install.

The following 64-bit software packages, or later packages, are required:

- `binutils-2.20.51.0.2-5.36.el6.x86_64.rpm`
- `cloog-ppl-0.15.7-1.2.el6.x86_64.rpm`
- `compat-libcap1-1.10-1.x86_64.rpm`
- `compat-libstdc++-33-3.2.3-69.el6.x86_64.rpm`
- `cpp-4.4.7-3.el6.x86_64.rpm`
- `elfutils-libelf0-0.152-1.el6.x86_64.rpm`
- `elfutils-libelf-devel-0.152-1.el6.x86_64.rpm`
- `gcc-4.4.7-3.el6.x86_64.rpm`
- `gcc-c++-4.4.7-3.el6.x86_64.rpm`
- `glibc-2.12-1.107.el6.x86_64.rpm`
- `glibc-common-2.12-1.107.el6.x86_64.rpm`
- `glibc-devel-2.12-1.107.el6.x86_64.rpm`
- `ksh-20100621-19.el6.x86_64.rpm`
- `libaio-0.3.107-10.el6.x86_64.rpm`
- `libaio-devel-0.3.107-10.el6.x86_64.rpm`
• libgcc-4.4.7-3.el6.x86_64.rpm
• libstdc++-4.4.7-3.el6.x86_64.rpm
• libstdc++-devel-4.4.7-3.el6.x86_64.rpm
• libXext-1.3.1-2.el6.x86_64.rpm
• make-3.81-20.el6.x86_64.rpm
• mpfr-2.4.1-6.el6.x86_64.rpm
• ppl-0.10.2-11.el6.x86_64.rpm
• sysstat-9.0.4-20.el6.x86_64.rpm
• unixODBC-2.2.14-12.el6_3.x86_64.rpm
• unixODBC-devel-2.2.14-12.el6_3.x86_64.rpm

The following 32-bit software packages, or later packages, are required:
• compat-libstdc++-33-3.2.3-69.el6.i686.rpm
• glibc-2.12-1.107.el6.i686.rpm
• glibc-devel-2.12-1.107.el6.i686.rpm
• libaio-0.3.107-10.el6.i686.rpm
• libao-0.8.8-7.1.el6.i686.rpm
• libgcc-4.4.7-3.el6.i686.rpm
• libstdc++-4.4.7-3.el6.i686.rpm
• nss-softokn-freebl-3.12.9-11.el6.i686.rpm

**Checking the disk space**

Check the amount of free disk space on the system.

```
df -k
```

The following disk space requirements must be met for Oracle installation:

• A minimum of 10 GB of free space in the `/home` directory.
• A minimum of 400 MB of free space in the `/tmp` directory.

The actual disk space requirements depend on the numbers of managed devices and performance monitoring instances. For more information, see the HPE IMC deployment guides.

**Creating operating system users and groups**

Create the **oracle** user, the **oinstall** group, and the **dba** group before installing Oracle.

• Only the **oracle** user can install, start, or stop the Oracle database.
• The **oinstall** group users can install Oracle software.
• The **dba** group users can manage the database.

To create the required users and groups:

1. Create the **oinstall** and the **dba** groups.

```
groupadd oinstall
groupadd dba
```

2. Create the **oracle** user and set the password of the user.

```
useradd -g oinstall -G dba -d /home/oracle -m -s /bin/bash oracle
passwd oracle
```
Modifying the permissions on the Oracle home directory

Grant the oracle user permissions to run the database installation program from the Oracle installation directory (/home/oracle).

```bash
chown -R oracle:oinstall /home/oracle/
chmod -R 775 /home/oracle/
```

Configuring the Oracle base directory

1. Create the Oracle base directory.
   ```bash
   mkdir -p /u01/app/
   ```
2. Set the directory owner and owner permissions.
   ```bash
   chown -R oracle:oinstall /u01/app/
   chmod -R 775 /u01/app/
   ```

Adjusting kernel parameters

To ensure normal operation of the Oracle database, adjust the kernel parameters:

1. Open the `sysctl.conf` file.
   ```bash
   vi /etc/sysctl.conf
   ```
2. Set the following variable values:
   ```bash
   kernel.shmall=2097152
   kernel.shmmmax=4294967295
   kernel.shmmni=4096
   kernel.sem=250 32000 100 128
   fs.file-max=6815744
   fs.suid_dumpable=1
   fs.aio-max-nr=1048576
   net.ipv4.ip_local_port_range=9000 65500
   net.core.rmem_default=4194304
   net.core.rmem_max=4194304
   net.core.wmem_default=262144
   net.core.wmem_max=1048576
   ```
3. Save and close the file.
4. Validate the new settings.
   ```bash
   /sbin/sysctl -p /etc/sysctl.conf
   ```

**NOTE:**

This example uses the minimum values for the kernel parameters. As a best practice, tune these values for optimal system performance.
Setting environment variables for the Oracle database

Set environment variables for the Oracle database in the profile file to automatically take effect at Linux startup.

To set the environment variables:

1. Open the profile file.
   
   vi /etc/profile

2. Add the following content to the file:
   
   ```
   ORACLE_BASE=/u01/app/oracle
   ORACLE_HOME=$ORACLE_BASE/product/12.1.0/db_1
   ORACLE_SID=orcl
   PATH=$PATH:$ORACLE_HOME/bin:$HOME/bin
   LD_LIBRARY_PATH=$ORACLE_HOME/lib
   export ORACLE_BASE ORACLE_HOME ORACLE_SID PATH LD_LIBRARY_PATH
   ```

   The variable description is as follows:
   
   - **ORACLE_BASE**—Oracle base directory.
   - **ORACLE_HOME**—Oracle home directory.
   - **ORACLE_SID**—Oracle database instance ID. Use the same instance ID for Oracle database installation.

3. Save and close the file.

Verifying the environment variable settings

Before you install the Oracle software, verify that the environment variable settings have taken effect:

1. Restart the operating system.

2. Verify that the environment variables have taken effect.
   
   ```
   echo $ORACLE_HOME
   /u01/app/oracle/product/12.1.0/db_1
   echo $LD_LIBRARY_PATH
   /u01/app/oracle/product/12.1.0/db_1/lib
   echo $ORACLE_SID
   orcl
   ```

Setting environment variables for the oracle user

1. Open the .bash_profile file.
   
   vi /home/oracle/.bash_profile

2. Set the language variable according to the language your system supports.
   
   ```
   LANG=en_US.UTF-8
   export LANG
   ```

3. Add the following content to the end of the file:
   
   ```
   umask 022
   ```

4. Save the file.
5. Switch to oracle and validate the new settings.
   ```
   su - oracle
   export DISPLAY=localhost:0.0
   ```
6. Switch to root.
   ```
   exit
   ```

### Setting the NLS_LANG environment variable

1. Open the profile file.
   ```
   vi /etc/profile
   ```
2. Add the following content to the file:
   ```
   NLS_LANG=AMERICAN_AMERICA.WE8IS859P1
   export NLS_LANG
   ```
3. Save and close the file.

The environment variable automatically takes effect at Linux startup.

#### IMPORTANT:
Set the correct value. Otherwise, IMC data cannot be displayed correctly. For more information about determining the NLS_LANG value, see *Oracle Database Globalization Support Guide*.

### Adding the IP-to-hostname mapping in /etc/hosts

1. Open the /etc/hosts file.
   ```
   vi /etc/hosts
   ```
2. Add a line of text in the format `ip-address localhost localhost.localdomain`.
   As shown in Figure 1, enter `192.168.1.158 imctest imctest.IMC` to map `192.168.1.158` to the host name `imctest` in the IMC domain.

#### Figure 1 Modifying the /etc/hosts file

![Figure 1 Modifying the /etc/hosts file](image)

3. Save and close the file.

### Preparing the installation package

Copy the Oracle installation package to the /home/oracle directory and decompress the package. If you use the installation CD, follow the instructions on the CD.
Database installation requirements for IMC

Install the Oracle database before you install IMC. IMC supports both local and remote databases.

To install a local Oracle database for IMC, perform the steps in "Installing and configuring the Oracle database server."

To install a remote Oracle database for IMC:

1. Install the database server on the remote server.
   See "Installing and configuring the Oracle database server" for the operation procedure.

2. Configure the following items on the database server:
   o A listener for receiving remote database connection request.
   o A network service name.
   o A data file folder for storing IMC data. You will need to specify the path to the folder during
     IMC installation. For more information, see the HPE IMC deployment guides.

3. On the server where you plan to install IMC, install the Oracle client for IMC to connect to the
   Oracle database.
   The client version must match the version of the Oracle database server. IMC uses the client to
   connect to the Oracle database.

4. Configure the network service name on the client. It must be the same as the network service
   name that is configured on the database server.
   For information about installing the Oracle client and configuring the network service name for
   the client, see "Installing and configuring the Oracle database client."

If you plan to deploy IMC in distributed mode, be sure to configure the correct network service names
on the IMC servers for them to connect to the database. During IMC installation, you need to specify
the network service name to be used by IMC for database connection.

The network service name configuration varies depending on whether IMC uses local or remote
databases, as illustrated in the following examples.

- Example 1
  Server A (master IMC server), and Servers B and C (subordinate IMC servers) use their
  respective local databases.
  Configure network service names as follows:
  o For each IMC server to connect to their local database:
    - Configure TNSNAME_A on Server A.
    - Configure TNSNAME_B on Server B.
    - Configure TNSNAME_C on Server C.
  o For the IMC servers to communicate with each other, configure the other two network
    service names on each server. For example, configure TNSNAME_B and TNSNAME_C on
    Server A. The configuration of the same network service name must be consistent on
    among all servers.

- Example 2
  Server A (master IMC server), and Servers B and C (subordinate IMC servers) share a remote
database server DBServer_D.
  Configure the servers as follows:
  o Install the Oracle client on each IMC server to connect to the remote database server.
  o Configure network service name TNSNAME_D on the remote database server.
- Configure network service name TNSNAME_D on the Oracle client of each IMC server.
Installing and configuring the Oracle database server

To install and configure the database, log in to Linux as oracle. Execute commands in subsequent sections as oracle, unless otherwise specified.

Installing the Oracle database server

1. Restart the operating system after you complete all preparation tasks in "Preparing for installation."

2. Log in to Linux as oracle, and then start the database installation wizard in the Oracle installation package directory.

   ./runInstaller

   The Configure Security Update page appears, as shown in Figure 2.
   
   Figure 2 Configure Security Updates page

3. Configure security updates settings as needed.
   - To receive security updates, enter an email address and click Next.
     You can also select I wish to receive security updates via My Oracle Support and enter My Oracle Support Password to receive security updates.
   - If you prefer not to receive security updates, click Next without providing the email or password. Click Yes in the dialog box shown in Figure 3, and then click Next.
The Select Installation Option page appears, as shown in Figure 4.

Figure 4 Select Installation Option page

4. Select **Create and configure a database** and click **Next**.

   The **System Class** page appears, as shown in Figure 5.
5. Select **Server class** and click **Next**.

   The **Grid Installation Options** page appears, as shown in **Figure 6**.
6. Select **Single instance database installation** and click **Next**. The **Select Install Type** page appears, as shown in **Figure 7**.
7. Select **Advanced install** and click **Next**.

The **Select Product Languages** page appears, as shown in Figure 8.
8. Select **English (United Kingdom)** and click **Next**.

The **Select Database Edition** page appears, as shown in Figure 9.
9. Select **Enterprise Edition** and click **Next**. The **Specify Installation Location** page appears, as shown in Figure 10.
10. Use the default settings and click Next.
    The Create Inventory page appears, as shown in Figure 11.
11. Use the default settings and click **Next**.

The **Select Configuration Type** page appears, as shown in **Figure 12**.
12. Select **General Purpose / Transaction Processing** and click **Next**.

The **Specify Database Identifiers** page appears, as shown in Figure 13.
13. Configure the following parameters:
   o Enter the global database name. This example uses orcl.
   o Enter the oracle system identifier (SID), which must be consistent with the ORACLE_SID variable setting in the profile file. This example uses orcl. For more information, see "Setting environment variables for the Oracle database."
   o The Create as Container database option is selected by default to create a container database, which can host multiple pluggable databases. IMC communicates with the pluggable databases during operation.
     This option affects the configuration of the listener and network service name. For more information, see "Configuring the Oracle database listener" and "Configuring the network service name of the database."

14. Click Next.
The Specify Configuration Options page appears, as shown in Figure 14.
15. Configure the memory settings as needed. Table 1 lists the recommended memory sizes.

Table 1 Recommended memory settings

<table>
<thead>
<tr>
<th>System memory</th>
<th>Local database</th>
<th>Remote database</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 GB</td>
<td>1400 MB</td>
<td>2400 MB</td>
</tr>
<tr>
<td>6 GB</td>
<td>2400 MB</td>
<td>3600 MB</td>
</tr>
<tr>
<td>8 GB</td>
<td>3600 MB</td>
<td>4800 MB</td>
</tr>
<tr>
<td>10 GB or larger</td>
<td>4500 MB</td>
<td>5000 MB</td>
</tr>
</tbody>
</table>

16. Click the Character sets tab, and then specify the character set for the database, as shown in Figure 15.
   - To prevent unreadable characters, set the correct character set for the database. This example uses West European WE8ISO8859P15.
   - If you are not sure of the language, select Use Unicode (AL32UTF8).

For more information about setting the database character set, see Oracle Database Globalization Support Guide.
17. Click **Next**.

The **Specify Database Storage Options** page appears, as shown in Figure 16.
18. Select **File system**, use the default database file location, and click **Next**. The **Specify Management Options** page appears, as shown in **Figure 16**.
19. Use the default settings and click **Next**.

The **Specify Management Options** page appears, as shown in Figure 18.
20. Use the default settings and click **Next**.

The **Specify Recovery Options** page appears, as shown in **Figure 19**.
21. Use the default settings and click **Next**.

The **Specify Schema Passwords** page appears, as shown in Figure 20.
22. Set passwords.
   - You can set different passwords for the database accounts SYS, SYSTEM, SYSMAN, and DBSNMP, or use the same password for all accounts.
   - For IMC to correctly identify the password of the SYS account during installation, make sure the password does not contain spaces, tabs, or any of the following characters: 
     ` " ' ( ) & | \ $ ; @ < > / ^
   - If you do not want to change the password of the SYS account, create a user account with the same privileges as the SYS account. Make sure the password of the user account does not contain any of the previous characters. For more information, see "Creating a database user."

23. Click Next.

The Privileged Operating System Groups page appears, as shown in Figure 21.
24. Set the database operator (OSOPER) group to `oinstall`, use the default settings for other parameters, and click **Next**.

The Perform Prerequisite Checks page appears, as shown in Figure 22.
The installation program checks the system environment and displays the check results.

25. Manually verify the items that are flagged with warnings or require a manual check.
   a. Modify the environment settings.
   b. If the kernel parameter or software package check fails, click Fix & Check again.

   The **Execute Fixup Scripts** dialog box appears, as shown in Figure 23.

Figure 23 Execute Fixup Scripts dialog box

Some of the prerequisites have failed on following nodes. Installer has generated a fixup script that can be run outside the installer to fix the issues. The following fixup script needs to be executed as the *root* user on the given nodes.

**Script**: `jtmp/CU_121.0.2.0_oracle/runfixup.sh`

**Nodes**: `zztest`

To execute the fixup scripts:
1. Open a terminal window
2. Login as *root*
3. Run the scripts
4. Return to this window and click *OK* to continue
c. Open a terminal window, switch to root, and execute the 
/tmp/CVU_12.1.0.2.0_oracle/runfixup.sh script, as shown in Figure 24.

Figure 24 Executing the script

```
[oracle@zztest Desktop]# cd /tmp/CVU_12.1.0.2.0_oracle
[root@zztest CVU_12.1.0.2.0_oracle]# ./runfixup.sh
All fix-up operations were completed successfully.
```

d. Close the terminal window.

In the Execute Fixup Scripts dialog box, click OK.

e. If the software package check fails because later versions of packages are installed, click Ignore all.

26. Click Next.

The Summary page appears, as shown in Figure 25.

Figure 25 Summary page

27. Click Install.

The Install Product page appears, as shown in Figure 26.
The installation program starts to install the database and displays the installation progress. During the installation, the **Execute Configuration scripts** dialog box appears, as shown in Figure 27.

**Figure 27** Execute Configuration scripts dialog box

The following configuration scripts need to be executed as the "root" user.

<table>
<thead>
<tr>
<th>Number</th>
<th>Script Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>/u01/app/orainventory/orainstRoot.sh</td>
</tr>
<tr>
<td>2</td>
<td>/u01/app/oracle/product/12.1.0/db_1/root.sh</td>
</tr>
</tbody>
</table>

To execute the configuration scripts:
1. Open a terminal window
2. Log in as "root"
3. Run the scripts
4. Return to this window and click "OK" to continue
28. Open a terminal window, switch to root, and execute the scripts instructed in Figure 27, as shown in Figure 28.

Figure 28 Executing configuration scripts

29. Close the terminal window.

30. In the Execute Configuration scripts dialog box, click OK.

When the database installation is complete, the Finish page appears, as shown in Figure 29.
31. Click Close.
32. Reboot Linux.

To adjust the database settings to meet your requirements, see "Managing Oracle Database 12c."

Configuring the Oracle database listener

1. Start Oracle Net Manager in the $ORACLE_HOME/bin directory.
   
   cd $ORACLE_HOME/bin/
   ./netmgr

2. From the navigation tree, select Local > Listeners > LISTENER.
3. In the right pane, select Database Services from the list, and then click Add Database.
   A new database tab appears.
4. Configure the global database name, location of the Oracle home directory, and the SID of the database instance, as shown in Figure 30.
   - For a non-container database, enter the global database name and SID specified during database installation.
   - For a container database, enter the global database name of a pluggable database in the Global Database Name field.
Configuring the network service name of the database

After the database installation is complete, the system automatically creates a default network service name, which is the same as the global database name.

- If the created database is not a container database, IMC communicates with the database by using the default network service name.
- If the created database is a container database, you must create a new network service name with the service name set to the pluggable database name for IMC communication.

You can configure the network service name by modifying the `tnsnames.ora` file, or by using Oracle Net Manager. For the configuration procedure by using Oracle Net Manager, see "Configuring the network service name for the client."

To configure the network service name by modifying the `tnsnames.ora` file:

1. Open a terminal window and open the file.
   ```
   cd $ORACLE_HOME/network/admin/
   vi tnsnames.ora
   ```
2. Add the network service name configuration to the file, as shown in Figure 31.
   - `PDBORCL` is the network service name for connecting to the database. If the database is a remote database for IMC, make sure you configure the same network service name on the Oracle database server and client.
- Set `SERVICE_NAME` to the service name of a pluggable database. This example uses `pdborcl`.

**Figure 31 Configuring a network service name**

```
PDBORCL =
  (DESCRIPTION =
    (ADDRESS LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = zztest)(PORT = 1521))
    )
  )
  (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = pdborcl)
  )
```
Installing and configuring the Oracle database client

To enable IMC to connect to a remote Oracle database server, you must install a compatible Oracle 12c client on the server that will host IMC.

Installing the Oracle client

1. Complete the tasks described in "Preparing for installation."
2. Restart the operating system, and then log in as Oracle.
3. Run the installation program from the Oracle client installation directory.
   
   ```
   ./runInstaller
   ```
   
   The Select Installation Type page appears, as shown in Figure 32.

   **Figure 32 Select Installation Type page**

4. Select Custom and click Next.
   
   The Select Product Languages page appears, as shown in Figure 33.
5. Select **English (United Kingdom)** and click **Next**.
   The **Specify Installation Location** page appears, as shown in **Figure 34**.
6. Use the default settings and click **Next**.

The **Create Inventory** page appears, as shown in **Figure 35**.
7. Use the default settings and click **Next**.

The **Available Product Components** page appears, as shown in **Figure 36**.
8. Select the following components:
   - Oracle SQLJ
   - Oracle Database Utilities
   - Oracle Java Client
   - SQL*Plus
   - Oracle JDBC/THIN Interfaces
   - Oracle Call Interface (OCI)
   - Oracle Connection Manager
   - Oracle ODBC Driver
   - Oracle SQL Developer

9. Click Next.
   The Perform Prerequisite Checks page appears, as shown in Figure 37.
10. Fix any failed check items, and then click **Next**.
The **Summary** page appears, as shown in **Figure 38**.
11. Click **Install**.

   The **Install Product** page appears, as shown in **Figure 39**.
The system starts installing the Oracle client and displays the installation progress. During installation, the Oracle Net Configuration Assistant shown in Figure 40 appears.

12. Use Oracle Net Configuration Assistant to configure the network service name to be used for connecting to the database server.

For more information about network service names, see "Configuring network service names."
13. Select the **Perform typical configuration** option and click **Next**. The **Execute Configuration scripts** dialog box appears, as shown in Figure 41.
14. Open a terminal window, switch to **root**, and execute the scripts instructed in Figure 41, as shown in Figure 42.
15. Close the terminal window.

16. In the **Execute Configuration scripts** dialog box, click **OK**.

17. Click **Close** on the **Finish** page, as shown in **Figure 43**.
Configuring the network service name for the client

Configure a network service name for the Oracle client to connect to the database server.

You can configure the network service name by modifying the tnsnames.ora file, or by using Oracle Net Manager. To modify the tnsnames.ora file, see “Configuring the network service name of the database.”

To configure the network service name by using Oracle Net Manager:

1. Go to the $ORACLE_HOME/bin directory and start Oracle Net Manager.
   
   cd $ORACLE_HOME/bin/
   ./netmgr

2. From the navigation tree, select Oracle Net Configuration > Local > Service Naming, as shown in Figure 44.
3. Click the Create icon in the toolbar.
   The Net Service Name Wizard appears, as shown in Figure 45.

Figure 45 Net Service Name Wizard

4. Enter orcl and click Next. The network service name must be the same as the name configured on the database server.
The **Protocol** page appears, as shown in **Figure 46**.

**Figure 46 Selecting a protocol**

5. Select **TCP/IP (Internet Protocol)** and click **Next**.

The **Protocol Settings** page appears, as shown in **Figure 47**.

**Figure 47 Protocol Settings page**

6. Enter the database server IP address as the **Host Name**, use the default port number, and click **Next**.
The Service page appears, as shown in Figure 48.

Figure 48 Configuring the service

7. Enter the global database name or pluggable database name of the database server in the Service Name field, use the default connection type, and click Next.

The Test page appears, as shown in Figure 49.

Figure 49 Test page

8. Click Test to test the connectivity to the database server, or click Finish to run the test later. For more information about running the test, see "Testing the connectivity to the server."

The Net Service Name Wizard closes.

9. View the service name configuration by selecting Oracle Net Configuration > Local > Service Naming > orcl from the navigation tree.
10. Save your configuration.

Testing the connectivity to the server

1. Log in to Linux as **oracle**.
2. In the terminal window, log in to the database as **sys**.
   
   ```
   sqlplus sys/IMC123@orcl as sysdba
   ```
   
   In the command, **sys** is the database user name, **IMC123** is the password, and **orcl** is the network service name.
3. Verify that the Oracle database server can be successfully logged in. (Details not shown.)
Managing Oracle Database 12c

To configure the database, you must log in to the system as oracle. Execute the configuration commands in the subsequent sections as oracle unless specified otherwise.

In the following examples, sys is the user name of the Oracle database administrator and iMC123 is the user password.

Starting the Oracle service manually

1. Start the listener control utility.
   ```bash
   cd $ORACLE_HOME/bin
   ./lsnrctl start
   ```
2. Verify that the listener control utility is started.
   ```bash
   ./lsnrctl service
   ```
3. Start the Oracle database.
   ```bash
   cd $ORACLE_HOME/bin
   ./sqlplus sys/iMC123 as sysdba
   SQL>startup
   SQL>exit
   ```
4. Start the pluggable database. This step is required if the Oracle database is a container database.
   ```bash
   cd $ORACLE_HOME/bin
   ./sqlplus sys/iMC123@PDBORCL as sysdba
   SQL>startup
   SQL>exit
   ```

   In the commands, PDBORCL is the network service name of the pluggable database.

Stopping the Oracle service manually

1. Stop the Oracle database.
   ```bash
   cd $ORACLE_HOME/bin
   ./sqlplus sys/iMC123 as sysdba
   SQL>shutdown immediate
   SQL>exit
   ```
2. Stop the listener control utility.
   ```bash
   cd $ORACLE_HOME/bin
   ./lsnrctl stop
   ```

Configuring network service names

**IMPORTANT:**

In distributed deployment, if IMC servers use different Oracle databases, you must configure a unique network service name for each database.

To enable IMC to connect to remote databases, you must configure correct network service names on the Oracle database server and client.
You can configure network service names by using Oracle Net Manager or Oracle Net Configuration Assistant, or by modifying the `tnsnames.ora` file. This procedure uses Oracle Net Configuration Assistant.

- To use Oracle Net Manager, see "Configuring the network service name for the client"
- To modify the `tnsnames.ora` file, see "Configuring the network service name of the database."

To configure the network service name by using Oracle Net Configuration Assistant:

1. Start the database service.
   See "Starting the Oracle service manually" for the operation procedure.
2. Start Oracle Net Configuration Assistant.
   ```
   cd $ORACLE_HOME/bin
   ./netca
   ```
   The Welcome page appears.
3. Select Local Net Service Name configuration and click Next, as shown in Figure 51.
   **Figure 51 Welcome page**
   ![Welcome page](image)

4. Select Add and click Next, as shown in Figure 52.
5. Enter the database service name `orcl` and click **Next**, as shown in **Figure 53**. The service name must be the same as the previously configured global database name or pluggable database name.

**Figure 53 Configuring a service name**

6. Select transmission protocol **TCP** and click **Next**, as shown in **Figure 54**.
7. On the **Configure Host and Port Number** page shown in Figure 55, configure the following parameters:
   - Enter the IP address of the database server in the **Host Name** field. For a local database, enter the host name or IP address.
   - Select **Use the standard port number of 1521**. This option is selected by default.

   **Figure 55 Configuring the host name and port number**

8. Click **Next**.
9. Select **Yes, perform a test**, and then click **Next**, as shown in Figure 56.
Figure 56 Testing connectivity to the database server

![Oracle Net Configuration Assistant: Net Service Name Configuration, Test](image)

Oracle Net Configuration Assistant displays the connectivity test result, as shown in Figure 57.

Figure 57 Test result

![Oracle Net Configuration Assistant: Net Service Name Configuration, Co](image)

10. If the connection attempt fails, click **Change Login** to change the login username and password, as shown in Figure 58.
11. Enter the correct password of the user **system**, and then click **OK**. Oracle Net Configuration Assistant performs a new connection test.

12. When you see a successful test result, click **Next**, as shown in **Figure 59**.

**Figure 59 Test result**

13. Enter a network service name, as shown in **Figure 60**.

The network service name must be different from the service name **orcl**. This name is automatically added to the list for selecting a network service name when you install IMC.
14. Click Next. The page for configuring another network service name appears, as shown in Figure 61.

Figure 61 Whether to configure another network service name

15. Configure the network service name as needed. In this example, select No and click Next. The configuration complete page appears, as shown in Figure 62.
16. Click **Next**.

17. On the page shown in **Figure 63**, click **Finish**.

**Figure 63 Completing network service name configuration**

---

**Setting the maximum number of Oracle processes and Oracle connection limit**

By default, the Oracle database allows a maximum of 150 connections. In centralized IMC deployment or when a database error occurs, you might need to modify the Oracle process and
connection limits according to the number of deployed IMC components. For more information, see *HPE Intelligent Management Center Getting Started Guide*.

### Automating Oracle database startup on Linux

1. Log in to Linux as **root**.
2. Copy the Oracle startup script **oracled.tar.gz** from the /manual directory of the IMC installation package to the Linux operating system.
3. Decompress the script file.
   ```bash
tar -xzf oracled.tar.gz
   ```
4. Copy the decompressed file to the /etc/rc.d/init.d directory.
   ```bash
cp oracled /etc/rc.d/init.d/
   ```
5. Change the file permissions.
   ```bash
chmod -R 755 oracled
   ```
6. Add the script to the startup configuration file of the Linux operating system.
   ```bash
chkconfig --add oracled
   ```
7. Open the Oracle configuration file /etc/oratab.
   ```bash
vi /etc/oratab
   ```
8. Set the following line to **Y**.
   ```text
orcl:/u01/app/oracle/product/12.1.0/db_1:Y
   ```
9. Save and close the file.

   The Oracle database automatically starts at the Linux startup.

10. To manually start or stop the Oracle database, use the following commands:
    ```bash
    service oracled start
    service oracled stop
    ```

### Creating a database user

IMC installation requires you to specify the correct database user for the Oracle database:

- For a non-container database, specify a database user who has the **sysdba** privilege.
- For a container database, specify a common database user who has the **sysdba** privilege and uses a name beginning with **c##** or **C##**.

To create a database user with the **sysdba** privilege:

1. Log in to the Oracle database as **sys**.
   ```sql
   sqlplus sys/iMC123 as sysdba
   In the command, **sys** is the database user name, **iMC123** is the password.
   2. Create a database user and grant the **sysdba** privilege to the user.
      - For a non-container database, create a database user named **imc** with the password **imcpassword**.
        ```sql
        create user imc identified by imcpassword;
        grant sysdba to imc;
        ```
      - For a container database, create a common database user named **c##imc** with the password **imcpassword**.
        ```sql
        create user c##imc identified by imcpassword container=all;
        grant sysdba to c##imc container=all;
        ```

        In the commands, the **container=all** string indicates that the configuration takes effect on both the container database and all its pluggable databases.
IMPORTANT:
For IMC to correctly identify the password during installation, make sure the password does not contain spaces, tabs, or any of the following characters:
"'"!()&\|$;@<>/^ 

Adding storage space to the database

The amount of storage space available on the database for IMC depends on the number of data files in the USERS tablespace. By default, the USERS tablespace has a single data file with a size limit of 32 GB. You can add data files to the USERS tablespace to provide additional storage.

The number of data files to add depends on the disk space required by the IMC components. For example, if IMC requires 300 GB for device management, create a minimum of ten data files (300 GB/32 GB = 9.375). If a database is used by multiple IMC components, create data files according to the total disk space required by the installed components.

You can add data files to the USERS tablespace through Oracle Enterprise Manager or by using SQL statements.

Adding database storage space through Oracle Enterprise Manager

1. Access the Oracle Enterprise Manager at:
https://ip-address:5500/em
   In the URL, ip-address is the IP address of the Oracle database server.
2. Log in to Oracle Enterprise Manager as SYSTEM, and then select Storage > Tablespace, as shown in Figure 64.

![Figure 64 Enterprise Manager]

3. Select the USERS tablespace and click Add Datafile, as shown in Figure 65.
The Add Datafiles to Tablespace USERS page appears, as shown in Figure 66.

Add Datafiles to Tablespace USERS

- Using Oracle-Managed Files
- Datafiles: [100M]
- Reuse Existing File
- Auto Extend
  - Increment: [100M]
  - Maximum File Size: Unlimited
4. Configure the data file parameters and click **OK**.
5. To add additional data files, repeat the steps in this procedure.
   If the system has multiple hard disk drives, distribute the data files on different disk drives for I/O load balancing.

Adding database storage space through SQL statements

1. Log in to Linux as **oracle**.
2. Log in to the Oracle database as **sys**.
   
   sqlplus sys/iMC123@orcl as sysdba
   
   In the command, **sys** is the database user name, **iMC123** is the password, and **orcl** is the network service name.
3. Display existing data files in the **USERS** tablespace.
   
   SQL> select file_name from dba_data_files where tablespace_name='USERS';
   
   +--------------------------+
   | FILE_NAME                |
   +--------------------------+
   | /u01/app/oracle/oradata/orcl/users01.dbf |
   +--------------------------+
   
   The output shows that the **USERS** tablespace contain only one data file in the
   /u01/app/oracle/oradata/orcl directory.
4. Add a new data file named **users02.dbf** to the directory.
   
   SQL> alter tablespace USERS add datafile
   
   '/u01/app/oracle/oradata/orcl/userdata02.dbf' size 1000M autoextend on next 100M maxsize UNLIMITED;
5. Add **users03.dbf**, **users04.dbf**, and more data files to the directory. (Details not shown.)

Modifying database memory settings

1. Log in to Linux as **oracle**.
2. Log in to the Oracle database as **sys**.
   
   sqlplus sys/iMC123@orcl as sysdba
   
   In the command, **sys** is the database user name, **iMC123** is the password, and **orcl** is the network service name.
3. Set the value of **MEMORY_TARGET**.
   
   SQL> alter system set MEMORY_TARGET=1700M scope=spfile;
   
   Table 2 lists the recommended memory sizes.

<table>
<thead>
<tr>
<th>System memory</th>
<th>Local database</th>
<th>Remote database</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 GB</td>
<td>1400 MB</td>
<td>2400 MB</td>
</tr>
<tr>
<td>6 GB</td>
<td>2400 MB</td>
<td>3600 MB</td>
</tr>
<tr>
<td>8 GB</td>
<td>3600 MB</td>
<td>4800 MB</td>
</tr>
<tr>
<td>10 GB or larger</td>
<td>4500 MB</td>
<td>5000 MB</td>
</tr>
</tbody>
</table>
Removing Oracle Database 12c

You can remove the Oracle database by using the uninstall script `deinstall` provided by the database, or remove Oracle program files, users, and user groups by executing commands as `root`. To use the uninstall script, see Oracle Database Installation Guide 12c Release 1 (12.1) for Linux.

To manually remove Oracle Database 12c:

1. Log in to Linux as `root`.
2. Stop the Oracle service.
   ```
   cd $ORACLE_HOME/bin
   sqlplus sys/imc123 as sysdba
   SQL> shutdown
   ```
   In the command, `imc123` is the password of the `sys` user.
3. Stop the listener.
   ```
   cd $ORACLE_HOME/bin
   ./lsnrctl stop
   ```
4. Delete the Oracle installation directory `/u01` in the root directory.
   ```
   cd /
   rm -rf /u01
   ```
5. Delete the directory `/usr/local/bin/oracle` (the default is `/user/local/bin`). This is the directory created by the configuration script during database installation (see Figure 28). The string of asterisks (*) in the command represents the name of the file to delete.
   ```
   rm -rf ****
   ```
6. Delete files `oratab` and `oraInst.loc` in the `/etc` directory.
   ```
   rm -rf oratab
   rm -rf oraInst.loc
   ```
7. Delete the `oracle` user.
   ```
   userdel oracle
   ```
8. Delete the `oinstall` user group.
   ```
   groupdel oinstall
   ```
9. Delete the `dba` user group.
   ```
   groupdel dba
   ```
10. Delete the `/home/oracle` directory.
    ```
    cd /home
    rm -rf oracle/
    ```
11. Delete the startup service.
    ```
    chkconfig --del dbora
    ```
12. Reboot Linux.
FAQ

Why does the system display an insufficient disk space error when creating the database instance?

Verify that the etc/sysctl.conf file is correctly configured. For more information, see "Adjusting kernel parameters."

Why are there unreadable characters displayed on IMC that uses the Oracle database?

The following issues can cause unreadable characters:

- Incorrect character set for the database.
  The character set selected for the Oracle database during installation is incompatible with the language setting of IMC. For example, the Oracle database uses the English character set, but IMC uses a non-English language coding. To resolve the issue, reinstall the Oracle database and select the correct character set.
- Incorrect NLS_LANG variable setting.
  The NLS_LANG environment variable is not set correctly. To resolve the issue, correct the NLS_LANG setting, and then restart the server and IMC. For information about setting the NLS_LANG variable, see "Setting the NLS_LANG environment variable."
- Incorrect LANG variable setting for the Oracle database server that uses the default character set.
  The LANG variable is not set correctly for a database server that is configured to use the default character set during installation. The default character set is determined by the LANG variable. For more information about setting the LANG variable, see "Setting environment variables for the oracle user."
  For example, the LANG variable is set to LANG=en_US.UTF-8 for a database that requires a non-English character set. If the database is configured to use the default character set, which is WE8ISO8859P15 in this example, unreadable characters will appear.
  To resolve the issue, reinstall the Oracle database with the correct character set. For more information, see "Installing and configuring the Oracle database server."

For more information about setting the database and client character sets, see Oracle Database Globalization Support Guide at the Oracle website.

How do I update database passwords for IMC?

After the database password of an IMC component is changed by using the database management tool, execute pwdmgr.bat to update the password in the server-addr.xml file on the IMC server. The file is located in the /common/conf/server-addr.xml file in the IMC installation path. It stores database passwords of all IMC components in ciphertext.

The following is an example for updating the password of the config_db database stored in IMC:

```
cd deploy/
./pwdmgr.sh --modify 127.0.0.1 config_db imc_config dbpasswd
```

Change password successfully

In the example, the dbpasswd string represents the new password of the imc_config user. The config_db string represents the database name. The 127.0.0.1 string represents the IP address of the database. The database IP address and name can be retrieved from the $IMCROOT/common/conf/server-addr.xml file.

If IMC is deployed in distributed mode, you must update the database password on every IMC server.

What should I do if the database server connection is very slow?

Verify that the DNS settings are correctly configured in the /etc/resolv.conf file.
vi resolv.conf
nameserver 10.72.66.36
nameserver 10.72.66.37
Document conventions

This section describes the conventions used in the documentation.

Port numbering in examples

The port numbers in this document are for illustration only and might be unavailable on your device.

Command conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boldface</td>
<td>Bold text represents commands and keywords that you enter literally as shown.</td>
</tr>
<tr>
<td><em>Italic</em></td>
<td><em>Italic</em> text represents arguments that you replace with actual values.</td>
</tr>
<tr>
<td>#</td>
<td>A line that starts with a pound (#) sign is comments.</td>
</tr>
</tbody>
</table>

GUI conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boldface</td>
<td>Window names, button names, field names, and menu items are in Boldface. For example, the New User window appears; click OK.</td>
</tr>
<tr>
<td>&gt;</td>
<td>Multi-level menus are separated by angle brackets. For example, File &gt; Create &gt; Folder.</td>
</tr>
</tbody>
</table>

Symbols

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="warning.png" alt="WARNING!" /></td>
<td>An alert that calls attention to important information that if not understood or followed can result in personal injury.</td>
</tr>
<tr>
<td><img src="caution.png" alt="CAUTION:" /></td>
<td>An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.</td>
</tr>
<tr>
<td><img src="important.png" alt="IMPORTANT:" /></td>
<td>An alert that calls attention to essential information.</td>
</tr>
<tr>
<td>NOTE:</td>
<td>An alert that contains additional or supplementary information.</td>
</tr>
<tr>
<td><img src="tip.png" alt="TIP:" /></td>
<td>An alert that provides helpful information.</td>
</tr>
</tbody>
</table>
Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website: www.hpe.com/assistance
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website: www.hpe.com/support/hpesc

Information to collect
- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates, go to either of the following:
  o Hewlett Packard Enterprise Support Center Get connected with updates page: www.hpe.com/support/e-updates
  o Software Depot website: www.hpe.com/support/softwaredepot
- To view and update your entitlements, and to link your contracts, Care Packs, and warranties with your profile, go to the Hewlett Packard Enterprise Support Center More Information on Access to Support Materials page: www.hpe.com/support/AccessToSupportMaterials

⚠️ IMPORTANT:
Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.
Websites

<table>
<thead>
<tr>
<th>Website</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking websites</td>
<td></td>
</tr>
<tr>
<td>Hewlett Packard Enterprise Networking Information Library</td>
<td><a href="http://www.hpe.com/networking/resourcefinder">www.hpe.com/networking/resourcefinder</a></td>
</tr>
<tr>
<td>Hewlett Packard Enterprise Networking website</td>
<td><a href="http://www.hpe.com/info/networking">www.hpe.com/info/networking</a></td>
</tr>
<tr>
<td>Hewlett Packard Enterprise Networking My Support</td>
<td><a href="http://www.hpe.com/networking/support">www.hpe.com/networking/support</a></td>
</tr>
<tr>
<td>General websites</td>
<td></td>
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<td>Hewlett Packard Enterprise Information Library</td>
<td><a href="http://www.hpe.com/info/enterprise/docs">www.hpe.com/info/enterprise/docs</a></td>
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<td>Hewlett Packard Enterprise Support Center</td>
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<td>Contact Hewlett Packard Enterprise Worldwide</td>
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<td>Subscription Service/Support Alerts</td>
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<td>Software Depot</td>
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</tr>
<tr>
<td>Customer Self Repair (not applicable to all devices)</td>
<td><a href="http://www.hpe.com/support/selfrepair">www.hpe.com/support/selfrepair</a></td>
</tr>
<tr>
<td>Insight Remote Support (not applicable to all devices)</td>
<td><a href="http://www.hpe.com/info/insightremotesupport/docs">www.hpe.com/info/insightremotesupport/docs</a></td>
</tr>
</tbody>
</table>

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:
www.hpe.com/support/selfrepair

Remote support

Remote support is available with supported devices as part of your warranty, Care Pack Service, or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product’s service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

For more information and device support details, go to the following website:
www.hpe.com/info/insightremotesupport/docs

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hpe.com). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.