

Oracle® Database

Quick Installation Guide

12c Release 1 (12.1) for IBM: Linux on System z

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This guide describes how to quickly install Oracle Database 12c Release 1 (12.1) on IBM: Linux on System z. It includes information about the following:

- [Reviewing Information About This Guide](#)
- [Logging In to the System as root](#)
- [Configuring Servers for Oracle Database](#)
- [Reviewing Operating System Security Common Practices](#)
- [About Operating System Requirements](#)
- [Operating System Requirements for IBM: Linux on System z](#)
- [Additional Drivers and Software Packages for Linux](#)
- [Checking the Software Requirements](#)
- [Creating Required Operating System Groups and Users](#)
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- [Creating Required Directories](#)
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1 Reviewing Information About This Guide

This guide describes how to install Oracle Database by using the default installation options.

Tasks Described in This Guide

The procedures in this guide describe how to:

- Configure your system to support Oracle Database
- Install Oracle Database on a local file system by using the Typical Installation option

- Configure a general-purpose Oracle Database installation that uses the local file system for database file storage

Results of a Successful Installation

After you successfully install Oracle Database:

- The database that you created and the default Oracle Net listener process run on the system.
- Oracle Enterprise Manager Database Express runs on the system and can be accessed using a web browser.

Tasks Not Described in This Guide

This guide covers the Typical Installation scenario and does *not* describe how to complete the following tasks:

- Using the Advanced Installation option to install the software
- Installing the software on a system that has an existing Oracle software installation
- Installing Oracle Clusterware and Oracle Real Application Clusters on a cluster
- Setting UDP and TCP kernel parameters manually
- Using alternative storage options such as Oracle Automatic Storage Management
- Installing and configuring Oracle Grid Infrastructure
- Automatically configuring Oracle Linux with Oracle RDBMS Pre-Install RPM
- Checking shared memory file system mount
- Using the Oracle RPM Checker utility on IBM: Linux on System z

Where to Get Additional Installation Information

For more information about installing Oracle Database, including information about the tasks not described in this guide, refer to one of the following guides:

- If you want to install the software on a single system, then refer to *Oracle Database Installation Guide for Linux*.
- If you want to install Oracle Grid Infrastructure for a standalone server, then refer to the "Oracle Grid Infrastructure" chapter in *Oracle Database Installation Guide for Linux*.
- If you want to perform an Oracle Real Application Clusters installation, then refer to *Oracle Grid Infrastructure Installation Guide for Linux* and *Oracle Real Application Clusters Installation Guide for Linux and UNIX*. These guides describe how to install Oracle Clusterware and Oracle Real Application Clusters. Oracle Clusterware is a prerequisite for Oracle Real Application Clusters installations.

The product documentation for Oracle Database products is available in both HTML and PDF formats online:

<http://docs.oracle.com/>

2 Logging In to the System as root

During installation, you must perform tasks as `root` or as other users on remote terminals. Complete the following procedure for user accounts that you want to enable for remote display.

To log in as the `root` user and enable remote display, complete one of the following procedures:

- If you are installing the software from an X Window System workstation or X terminal, then:
 1. Start a new X terminal session (`xterm`).
 2. If you are installing the software on another system and using the system as an X11 display, then enter a command using the following syntax to enable remote hosts to display X applications on the local X server:

```
$ xhost + RemoteHost
```

where *RemoteHost* is the fully qualified remote host name. For example:

```
$ xhost + somehost.example.com
somehost.example.com being added to the access control list
```

3. If you are not installing the software on the local system, then use the `ssh`, `rlogin`, or `telnet` command to connect to the system where you want to install the software:

```
$ ssh -Y RemoteHost
```

4. If you are not logged in as the `root` user, then enter the following command to switch the user to `root`:

```
$ su - root
password:
#
```

- To install the software from a PC or other system with X server software:

Note: If necessary, see the X server documentation, or contact your X server vendor or system administrator for more information about completing this procedure. Depending on the X server software that you are using, you may have to complete the tasks in a different order.

1. Start the X Window System software.
2. Configure the security settings of the X Window System software to permit remote hosts to display X applications on the local system.
3. Connect to the remote system where you want to install the software as the oracle software installation owner (`oracle`) and start an X terminal session (`xterm`) on that system.
4. Open another terminal on the remote system, and log in as the `root` user on the remote system, so you can run scripts as `root` when prompted.

3 Configuring Servers for Oracle Database

This section describes the following operating system tasks you must complete before you install Oracle Database:

- [Checking Server Hardware and Memory Configuration](#)
- [General Server Minimum Requirements](#)
- [Server Storage Minimum Requirements](#)
- [Server Memory Minimum Requirements](#)

3.1 Checking Server Hardware and Memory Configuration

Run the following commands to check your current system information:

1. To determine the physical RAM size, enter the following command:

```
# grep MemTotal /proc/meminfo
```

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

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

```
# grep SwapTotal /proc/meminfo
```

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

3. To determine the amount of space available in the `/tmp` directory, enter the following command:

```
# df -h /tmp
```

4. To determine the amount of free disk space on the system, enter the following command:

```
# df -h
```

5. To determine the amount of free RAM and disk swap space on the system, enter the following command:

```
# free
```

6. To determine if the system architecture can run the software, enter the following command:

```
# uname -m
```

Verify that the processor architecture matches the Oracle software release to install.

If you do not see the expected output, then you cannot install the software on this system.

3.2 General Server Minimum Requirements

Ensure the following general minimum requirements on your system:

- Ensure that the system is started with runlevel 3 or runlevel 5.

- Ensure display cards provide at least 1024 x 768 display resolution, so that Oracle Universal Installer displays correctly while performing a system console-based installation

3.3 Server Storage Minimum Requirements

Ensure that your system meets the following minimum storage requirements.

- Ensure that your system meets the disk space requirements for software files as described in [Table 1](#)

Table 1 Disk Space Requirements for IBM: Linux on System z

Installation Type	Disk Space for Software Files (GB)
Enterprise Edition	5.5
Standard Edition	5.4
Standard Edition One	5.5
Standard Edition 2	5.4

Additional disk space, either on a file system or on an Oracle ASM disk group is required for the fast recovery area.

- 1 GB of space in the `/tmp` directory.

If the free space available in the `/tmp` directory is less than what is required, then complete one of the following steps:

- Delete unnecessary files from the `/tmp` directory to meet the disk space requirement.
- Set the `TMP` and `TMPDIR` environment variables when setting the `oracle` user's environment.

See Also: "[Configuring Oracle Software Owner Environment](#)" on page 1-23 for more information about setting `TMP` and `TMPDIR`

- Extend the file system that contains the `/tmp` directory.

3.4 Server Memory Minimum Requirements

Ensure that your system meets the following memory requirements:

Minimum: 1 GB of RAM

Recommended: 2 GB of RAM or more

[Table 2](#) describes the relationship between the installed RAM and the configured swap space recommendation:

Table 2 Swap Space Requirement

RAM	Swap Space
Between 1 GB and 2 GB	1.5 times the size of RAM
Between 2 GB and 16 GB	Equal to the size of RAM
More than 16 GB	16 GB

4 Reviewing Operating System Security Common Practices

Secure operating systems are an important basis for general system security. Ensure that your operating system deployment is in compliance with common security practices as described in your operating system vendor security guide.

5 About Operating System Requirements

Depending on the products that you intend to install, verify that you have the required operating system kernel and packages installed.

Requirements listed in this document are current as of the date listed on the title page. To obtain the most current information about kernel requirements, see the online version at the following URL:

<http://docs.oracle.com/>

Oracle Universal Installer performs checks your system to verify that it meets the listed operating system package requirements. To ensure that these checks complete successfully, verify the requirements before you start OUI.

Note: Oracle does not support running different operating system versions on cluster members, unless an operating system is being upgraded. You cannot run different operating system version binaries on members of the same cluster, even if each operating system is supported.

6 Operating System Requirements for IBM: Linux on System z

The Linux distributions and packages listed in this section are supported for this release on IBM: Linux on System z.

Identify operating system requirements for Oracle Database installations.

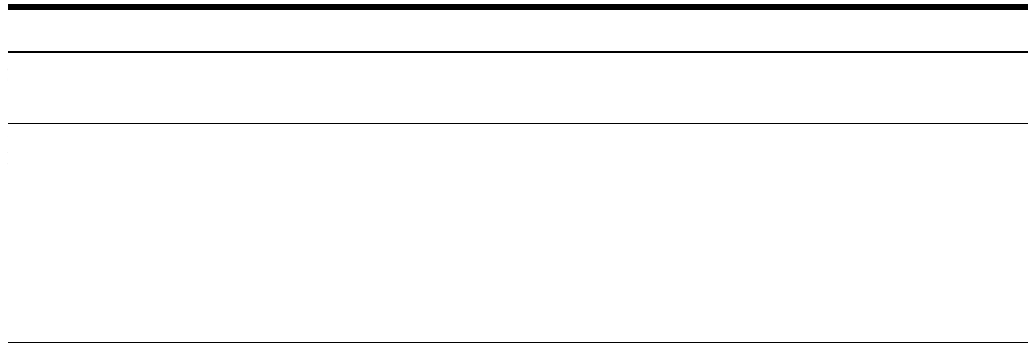
- [Supported Red Hat Enterprise Linux 7 Distributions for IBM: Linux on System z](#)
- [Supported Red Hat Enterprise Linux 6 Distributions for IBM: Linux on System z](#)
- [Supported Red Hat Enterprise Linux 5 Distributions for IBM: Linux on System z](#)
- [Supported SUSE Distributions for IBM: Linux on System z](#)

Note:

- For the 12.1 release, starting with Oracle Database 12c Release 1 (12.1.0.2), Red Hat Enterprise Linux 7.1 and SUSE Linux Enterprise Server 12 SP1 are certified on IBM: Linux on System z.
 - Oracle Universal Installer requires an X Window System (for example, `libx`). The `libx` packages are part of a default Linux installation. If you perform an install on a system with a reduced set of packages, then you must ensure that `libx` is installed.
 - The 32-bit packages listed in the following sections are required only for 32-bit client installs.
-
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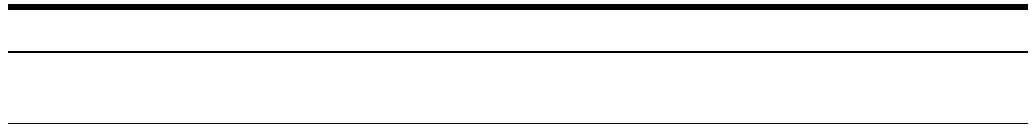
6.1 Supported Red Hat Enterprise Linux 7 Distributions for IBM: Linux on System z

Use the following information to check the minimum supported Red Hat Linux 7 distributions:



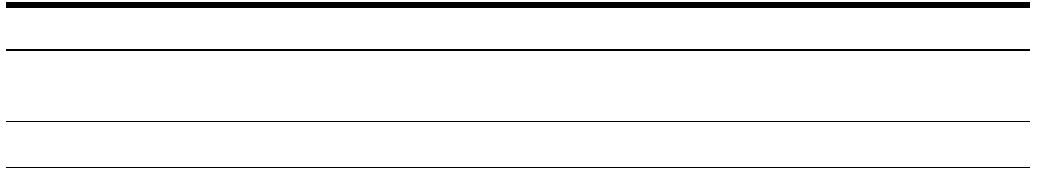
6.2 Supported Red Hat Enterprise Linux 6 Distributions for IBM: Linux on System z

Use the following information to check the minimum supported Red Hat Linux 6 distributions:



6.3 Supported Red Hat Enterprise Linux 5 Distributions for IBM: Linux on System z

Use the following information to check the minimum supported Red Hat Linux 5 distributions:



6.4 Supported SUSE Distributions for IBM: Linux on System z

Use the following information to check the minimum supported SUSE distributions:

Table 6 SUSE 11 Minimum Operating System Requirements

Item	Minimum Requirement
SSH Requirement	Ensure that OpenSSH is installed on your servers. OpenSSH is the required SSH software.

Table 6 (Cont.) SUSE 11 Minimum Operating System Requirements

Item	Minimum Requirement
SUSE Linux Enterprise Server	<ul style="list-style-type: none">■ SUSE Linux Enterprise Server 11 SP2: 3.0.13-0.27-default s390x or later■ SUSE Linux Enterprise Server 12 SP1: 3.12.53-60.30.1-default s390x or later
SUSE 11	<p>The following packages (or later versions) must be installed:</p> <p>binutils-2.21.1-0.7.25 (s390x) gcc-4.3-62.198 (s390x) gcc-c++-4.3-62.198 (s390x) glibc-2.11.3-17.31.1 (s390x) glibc-32bit-2.11.3-17.31.1 (s390x) glibc-devel-2.11.3-17.31.1 (s390x) glibc-devel-32bit-2.11.3-17.31.1 (s390x) ksh-93u-0.6.1 (s390x) make-3.81-128.20 (s390x) libaio-0.3.109-0.1.46 (s390x) libaio-32bit-0.3.109-0.1.46 (s390x) libaio-devel-0.3.109-0.1.46 (s390x) libaio-devel-32bit-0.3.109-0.1.46 (s390x) libcap1-1.10-6.10 (s390x) libgcc46-4.6.1_20110701-0.13.9 (s390x) libstdc++33-3.3.3-11.9 (s390x) libstdc++33-32bit-3.3.3-11.9 (s390x) libstdc++43-devel-32bit-4.3.4_20091019-0.22.17 (s390x) libstdc++43-devel-4.3.4_20091019-0.22.17 (s390x) libstdc++46-32bit-4.6.1_20110701-0.13.9 (s390x) libstdc++46-4.6.1_20110701-0.13.9 (s390x) sysstat-8.1.5-7.32.1 (s390x) xorg-x11-libs-32bit-7.4-8.26.32.1 (s390x) xorg-x11-libs-7.4-8.26.32.1 (s390x) xorg-x11-libX11-32bit-7.4-5.9.1 (s390x) xorg-x11-libX11-7.4-5.9.1 (s390x) xorg-x11-libXau-32bit-7.4-1.15 (s390x) xorg-x11-libXau-7.4-1.15 (s390x) xorg-x11-libxcb-7.4-1.20.34 (s390x) xorg-x11-libxcb-32bit-7.4-1.20.34 (s390x) xorg-x11-libXext-32bit-7.4-1.16.21 (s390x) xorg-x11-libXext-7.4-1.16.21 (s390x)</p>

Table 6 (Cont.) SUSE 11 Minimum Operating System Requirements

Item	Minimum Requirement
SUSE 12	<p>The following packages (or later versions) must be installed:</p> <p>binutils-2.25.0-13.1 (s390x) gcc-32bit-4.8-6.189 (s390x) gcc48-4.8.5-24.1 (s390x) gcc48-32bit-4.8.5-24.1 (s390x) gcc48-c++-4.8.5-24.1 (s390x) gcc48-info-4.8.5-24.1 (noarch) gcc48-locale-4.8.5-24.1 (s390x) gcc-c++-4.8-6.189 (s390x) gcc-c++-32bit-4.8-6.189 (s390x) gcc-info-4.8-6.189 (s390x) gcc-locale-4.8-6.189 (s390x) glibc-2.19-31.9 (s390x) glibc-32bit-2.19-31.9 (s390x) glibc-devel-2.19-31.9 (s390x) glibc-devel-32bit-2.19-31.9 (s390x) libaio1-0.3.109-17.15 (s390x) libaio1-32bit-0.3.109-17.15 (s390x) libaio-devel-0.3.109-17.15 (s390x) libcap1-1.10-59.61 (s390x) libcap1-32bit-1.10-59.61 (s390x) libcap2-2.22-11.709 (s390x) libcap2-32bit-2.22-11.709 (s390x) libcap-ng0-0.7.3-4.125 (s390x) libcap-ng0-32bit-0.7.3-4.125 (s390x) libcap-ng-utils-0.7.3-4.125 (s390x) libcap-progs-2.22-11.709 (s390x) libgcc_s1-5.2.1+r226025-4.1 (s390x) libgcc_s1-32bit-5.2.1+r226025-4.1 (s390x) libgomp1-32bit-5.2.1+r226025-4.1 (s390x) libstdc++48-devel-4.8.5-24.1 (s390x) libstdc++48-devel-32bit-4.8.5-24.1 (s390x) libstdc++6-5.2.1+r226025-4.1 (s390x) libstdc++6-32bit-5.2.1+r226025-4.1 (s390x) libstdc++-devel-4.8-6.189 (s390x) libstdc++-devel-32bit-4.8-6.189 (s390x) libXtst6-1.2.2-3.60 (s390x) libXtst6-32bit-1.2.2-3.60 (s390x) make-4.0-4.1 (s390x) mksh-50-2.13 (s390x) sysstat-10.2.1-3.1 (s390x) xorg-x11-7.6_1-14.17 (noarch) xorg-x11-essentials-7.6_1-14.17 (noarch) xorg-x11-fonts-7.6-29.45 (noarch) xorg-x11-fonts-core-7.6-29.45 (noarch) xorg-x11-fonts-7.6-45.14 (noarch) xorg-x11-server-7.6_1.15.2-36.21 (s390x) xorg-x11-server-extra-7.6_1.15.2-36.21 (s390x) xorg-x11-Xvnc-1.4.3-7.2 (s390x)</p>

7 Additional Drivers and Software Packages for Linux

You are not required to install additional drivers and packages, but you may choose to install or configure drivers and packages in the following list:

- [Installation Requirements for Open Database Connectivity](#)
- [Installation Requirements for PAM on Linux](#)
- [Installation Requirements for Oracle Messaging Gateway](#)
- [Installation Requirements for Lightweight Directory Access Protocol](#)
- [Installation Requirements for Programming Environments for Linux](#)
- [Installation Requirements for Web Browsers](#)

Note: Oracle Database Smart Flash Cache is an Enterprise Edition only feature.

7.1 Installation Requirements for Open Database Connectivity

Review the following sections if you plan to install Open Database Connectivity (ODBC):

- [About ODBC Drivers and Oracle Database](#)
- [Installing Oracle ODBC Driver](#)

7.1.1 About ODBC Drivers and Oracle Database

Open Database Connectivity (ODBC) is a set of database access APIs that connect to the database, prepare, and then run SQL statements on the database. An application that uses an ODBC driver can access non-uniform data sources, such as spreadsheets and comma-delimited files.

7.1.2 Installing Oracle ODBC Driver

If you intend to use ODBC, then install the most recent ODBC Driver Manager for Linux. Download and install the ODBC Driver Manager and Linux RPMs from the following website:

<http://www.unixodbc.org>

Review the minimum supported ODBC driver, and install the following ODBC driver, or later releases, for all distributions of Linux:

unixODBC-2.3.1 or later

7.2 Installation Requirements for PAM on Linux

Review the following sections to install PAM:

- [About PAM and Login Authentication](#)
- [Installing PAM Library](#)

7.2.1 About PAM and Login Authentication

Pluggable Authentication Modules (PAM) is a system of libraries that handle user authentication tasks for applications. On Linux, external scheduler jobs require PAM. Oracle strongly recommends that you install the latest Linux-PAM library for your Linux distribution.

7.2.2 Installing PAM Library

Use a package management system (`yum`, `up2date`, `YaST`) for your distribution to install the latest `pam` library.

7.3 Installation Requirements for Oracle Messaging Gateway

Review the following sections to install Oracle Messaging Gateway:

- [About Oracle Messaging Gateway](#)
- [Installing Oracle Messaging Gateway](#)

7.3.1 About Oracle Messaging Gateway

Oracle Messaging Gateway is a feature of the Oracle database. It enables communication between applications based on non-Oracle messaging systems and Oracle Streams Advanced Queuing.

Oracle Messaging Gateway supports the integration of Oracle Streams Advanced Queuing (AQ) with applications based on WebSphere. For information on supported versions see *Oracle Database Advanced Queuing User's Guide*.

Note: Oracle Messaging Gateway does not support the integration of Advanced Queuing with TIBCO Rendezvous on IBM: Linux on System z.

7.3.2 Installing Oracle Messaging Gateway

Oracle Messaging Gateway is installed with the Enterprise Edition of Oracle Database.

If you require a CSD for IBM WebSphere MQ, then see the following website for download and installation information:

<http://www.ibm.com>

7.4 Installation Requirements for Lightweight Directory Access Protocol

Review the following sections to install Lightweight Directory Access Protocol:

- [About LDAP and Oracle Plug-ins](#)
- [Installing the LDAP Package](#)

7.4.1 About LDAP and Oracle Plug-ins

Lightweight Directory Access Protocol (LDAP) is an application protocol for accessing and maintaining distributed directory information services over IP networks. You require the LDAP package if you want to use features requiring LDAP, including the Oracle Database scripts `odisrvreg` and `oidca` for Oracle Internet Directory, or `schemasync` for third-party LDAP directories.

7.4.2 Installing the LDAP Package

LDAP is included in a default Linux operating system installation.

If you did not perform a default Linux installation, and you intend to use Oracle scripts requiring LDAP, then use a package management system (`up2date`, `YaST`) for your distribution to install a supported LDAP package for your distribution, and install any other required packages for that LDAP package.

7.5 Installation Requirements for Programming Environments for Linux

Review the following sections to install programming environments:

- [About Programming Environments and Oracle Database](#)
- [Configuring Support for Programming Environments](#)

7.5.1 About Programming Environments and Oracle Database

Oracle Database supports multiple programming languages for application development in different environments. Some languages require that you install additional compiler packages for the operating system.

Programming environments are options. They are not required for Oracle Database.

See Also: *Oracle Database Development Guide* for an overview of programming environments

7.5.2 Configuring Support for Programming Environments

Ensure that your system meets the requirements for the programming environment you want to configure:

Table 7 Requirements for Programming Environments

Programming Environments	Support Requirements
Java Database Connectivity (JDBC) / Oracle Call Interface (OCI)	<ul style="list-style-type: none">■ JDK 6 (1.6.0 SR12)■ JDK 7 (1.7.0) JDK 1.6 is installed with this release.
Pro*COBOL	Micro Focus Server Express 5.1

7.6 Installation Requirements for Web Browsers

Web browsers are required only if you intend to use Oracle Enterprise Manager Database Express and Oracle Enterprise Manager Cloud Control. Web browsers must support JavaScript, and the HTML 4.0 and CSS 1.0 standards.

For a list of browsers that meet these requirements see the Enterprise Manager certification matrix on My Oracle Support:

<https://support.oracle.com>

See Also: *Oracle Enterprise Manager Cloud Control Basic Installation Guide* for steps on how to access the Enterprise Manager certification matrix

8 Checking the Software Requirements

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

1. To determine the distribution and version of Linux installed, enter one of the following commands:

```
# lsb_release -id
```

2. To determine whether the required kernel errata is installed, enter the following command:


```
# uname -r
```

Review the required errata level for your distribution. If the errata level is previous to the required minimum errata update, then obtain and install the latest kernel update from your Linux distributor.

3. To determine whether the required packages are installed, enter commands similar to the following:

```
# rpm -q package_name
```

Alternatively, if you require specific system architecture information, then enter the following command:

```
# rpm -qa --queryformat "%{NAME}-%{VERSION}-%{RELEASE} (%{ARCH})\n" | grep package_name
```

You can also combine a query for multiple packages, and review the output for the correct versions. For example:

```
# rpm -q binutils compat-libstdc++ gcc glibc libaio libgcc libstdc++ \
make sysstat unixodbc
```

If a package is not installed, then install it from your Linux distribution media or download the required package version from your Linux distributor's website.

9 Creating Required Operating System Groups and Users

The following local operating system groups and users are required if you are installing Oracle Database:

- The Oracle Inventory group (typically, `oinstall`)
- The OSDBA group (typically, `dba`)
- The Oracle software owner (typically, `oracle`)
- The OSOPER group (optional. Typically, `oper`)

To determine whether these groups and users exist, and if necessary, to create them, follow these steps:

1. To determine whether the `oinstall` group exists, enter the following command:

```
# more /etc/oraInst.loc
```

If the output of this command shows the `oinstall` group name, then the group exists.

If the `oraInst.loc` file exists, then the output from this command is similar to the following:

```
inventory_loc=/u01/app/oraInventory
inst_group=oinstall
```

The `inst_group` parameter shows the name of the Oracle Inventory group, `oinstall`.

2. To determine whether the `dba` group exists, enter the following command:

```
# grep dba /etc/group
```

If the output from this commands shows the dba group name, then the group exists.

3. If necessary, enter the following commands to create the oinstall and dba groups:

```
# /usr/sbin/groupadd oinstall
# /usr/sbin/groupadd dba
```

4. To determine whether the oracle user exists and belongs to the correct groups, enter the following command:

```
# id oracle
```

If the oracle user exists, then this command displays information about the groups to which the user belongs. The output should be similar to the following, indicating that oinstall is the primary group and dba is a secondary group:

```
uid=440(oracle) gid=200(oinstall) groups=201(dba),202(oper)
```

5. If necessary, complete one of the following actions:

- If the oracle user exists, but its primary group is not oinstall or it is not a member of the dba group, then enter the following command:

```
# /usr/sbin/usermod -g oinstall -G dba oracle
```

- If the oracle user does not exist, enter the following command to create it:

```
# /usr/sbin/useradd -g oinstall -G dba oracle
```

This command creates the oracle user and specifies oinstall as the primary group and dba as the secondary group.

Oracle does not support modifying an existing installation owner. See *Oracle Database Installation Guide* for more information.

6. Enter the following command to set the password of the oracle user:

```
# passwd oracle
```

10 Configuring Kernel Parameters and Resource Limits

Verify that the kernel parameters shown in the following table are set to values greater than or equal to the minimum value shown. The procedure following the table describes how to verify and set the values.

Note: The kernel parameter and shell limit values in this section are minimum values only. For production database systems, Oracle recommends that you tune these values to optimize the performance of the system. Refer to your operating system documentation for more information about tuning kernel parameters.

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To view the current value specified for these kernel parameters, and to change them if necessary:

- Enter commands similar to the following to view the current values of the kernel parameters:

Note: Make a note of the current values and identify any values that you must change.

Parameter	Command
semmsl, semmns, semopm, and semmni	# /sbin/sysctl -a grep sem This command displays the value of the semaphore parameters in the order listed.
shmall, shmmax, and shmmni	# /sbin/sysctl -a grep shm
file-max	# /sbin/sysctl -a grep file-max
ip_local_port_ range	# /sbin/sysctl -a grep ip_local_port_range
rmem_default	# /sbin/sysctl -a grep rmem_default
rmem_max	# /sbin/sysctl -a grep rmem_max
wmem_default	# /sbin/sysctl -a grep wmem_default
wmem_max	# /sbin/sysctl -a grep wmem_max

- If the value of any kernel parameter is different from the recommended value, then complete the following steps:
 1. Using any text editor, create or edit the `/etc/sysctl.conf` file, and add or edit lines similar to the following:

Note: Include lines only for the kernel parameter values to change. For the semaphore parameters (`kernel.sem`), you must specify all four values. However, if any of the current values are larger than the minimum value, then specify the larger value.

```
fs.aio-max-nr = 1048576
fs.file-max = 6815744
kernel.shmall = 2097152
kernel.shmmax = 536870912
kernel.shmmni = 4096
kernel.sem = 250 32000 100 128
net.ipv4.ip_local_port_range = 9000 65500
net.core.rmem_default = 262144
net.core.rmem_max = 4194304
net.core.wmem_default = 262144
net.core.wmem_max = 1048586
```

By specifying the values in the `/etc/sysctl.conf` file, they persist when you restart the system. However, on SUSE Linux Enterprise Server systems, enter

the following command to ensure that the system reads the `/etc/sysctl.conf` file when it restarts:

```
# /sbin/chkconfig boot.sysctl on
```

2. Enter the following command to change the current values of the kernel parameters:

```
# /sbin/sysctl -p
```

Review the output from this command to verify that the values are correct. If the values are incorrect, edit the `/etc/sysctl.conf` file, then enter this command again.

3. Enter the command `/sbin/sysctl -a` to confirm that the values are set correctly.
4. On SUSE systems only, enter the following command to cause the system to read the `/etc/sysctl.conf` file when it restarts:

```
# /sbin/chkconfig boot.sysctl on
```

5. On SUSE systems only, you must enter the GID of the `oinstall` group as the value for the parameter `/proc/sys/vm/hugetlb_shm_group`. Doing this grants members of `oinstall` a group permission to create shared memory segments.

For example, where the `oinstall` group GID is 501:

```
# echo 501 > /proc/sys/vm/hugetlb_shm_group
```

After running this command, use `vi` to add the following text to `/etc/sysctl.conf`, and enable the `boot.sysctl` script to run on system restart:

```
vm.hugetlb_shm_group=501
```

Note: Only one group can be defined as the `vm.hugetlb_shm_group`.

6. After updating the values of kernel parameters in the `/etc/sysctl.conf` file, either restart the computer, or run the command `sysctl -p` to make the changes in the `/etc/sysctl.conf` file available in the active kernel memory.

Check Resource Limits for the Oracle Software Installation Users

For each installation software owner, check the resource limits for installation, using the following recommended ranges:

Table 8 *Installation Owner Resource Limit Recommended Ranges*

Resource Shell Limit	Resource	Soft Limit (KB)	Hard Limit (KB)
Open file descriptors	nofile	at least 1024	at least 65536
Number of processes available to a single user	nproc	at least 2047	at least 16384
Size of the stack segment of the process	stack	at least 10240	at least 10240, and at most 32768

Table 8 (Cont.) Installation Owner Resource Limit Recommended Ranges

Resource Shell Limit	Resource	Soft Limit (KB)	Hard Limit (KB)
Maximum Locked Memory Limit	memlock	at least 90 percent of the current RAM when HugePages memory is enabled and at least 3145728 KB (3 GB) when HugePages memory is disabled	at least 90 percent of the current RAM when HugePages memory is enabled and at least 3145728 KB (3 GB) when HugePages memory is disabled

To check resource limits:

1. Log in as an installation owner.
2. Check the soft and hard limits for the file descriptor setting. Ensure that the result is in the recommended range. For example:

```
$ ulimit -Sn
4096
$ ulimit -Hn
65536
```

3. Check the soft and hard limits for the number of processes available to a user. Ensure that the result is in the recommended range. For example:

```
$ ulimit -Su
2047
$ ulimit -Hu
16384
```

4. Check the soft limit for the stack setting. Ensure that the result is in the recommended range. For example:

```
$ ulimit -Ss
10240
$ ulimit -Hs
32768
```

5. Repeat this procedure for each Oracle software installation owner.

If necessary, update the resource limits in the `/etc/security/limits.conf` configuration file for the installation owner. However, note that the configuration file is distribution specific. Contact your system administrator for distribution specific configuration file information.

Note: If the `grid` or `oracle` users are logged in, then changes in the `limits.conf` file do not take effect until you log these users out and log them back in. You must do this before you use these accounts for installation.

11 Creating Required Directories

Create directories with names similar to the following, and specify the correct owner, group, and permissions for them:

- The Oracle base directory
- An optional Oracle data file directory

The Oracle base directory must have 3 GB of free disk space, or 4 GB of free disk space if you choose not to create a separate Oracle data file directory.

Note: If you do not want to create a separate Oracle data file directory, then you can install the data files in a subdirectory of the Oracle base directory. However, this is not recommended for production databases.

To create the Oracle base directory:

1. Enter the following command to display information about all mounted file systems:

```
# df -k
```

This command displays information about all the file systems mounted on the system, including:

- The physical device name
 - The total amount, used amount, and available amount of disk space
 - The mount point directory for that file system
2. From the display, identify either one or two file systems that meet the disk space requirements mentioned earlier in this section.
 3. Note the name of the mount point directory for each file system that you identified.
 4. Enter commands similar to the following to create the recommended subdirectories in the mount point directory that you identified and set the appropriate owner, group, and permissions on them:

```
# mkdir -p /mount_point/app/  
# chown -R oracle:oinstall /mount_point/app/  
# chmod -R 775 /mount_point/app/
```

For example:

```
# mkdir -p /u01/app/  
# chown -R oracle:oinstall /u01/app/  
# chmod -R 775 /u01/app/
```

12 Configuring Oracle Software Owner Environment

You run Oracle Universal Installer from the `oracle` account. However, before you start Oracle Universal Installer you must configure the environment of the `oracle` user. To configure the environment, you must:

- Set the default file mode creation mask (`umask`) to 022 in the shell startup file.

- Set the DISPLAY environment variable.

Caution: Use shell programs supported by your operating system vendor. If you use a shell program that is not supported by your operating system, then you can encounter errors during installation.

To set the oracle user's environment:

1. Start a new X terminal session (xterm).
2. Enter the following command to ensure that X Window applications can display on this system:

```
$ xhost + RemoteHost
```

where *RemoteHost* is the fully qualified remote host name. For example:

```
$ xhost + somehost.example.com
```

3. If you are not logged in to the system where you want to install the software, then log in to that system as the oracle user.
4. If you are not logged in as the oracle user, then switch user to oracle:

```
$ su - oracle
```

5. To determine the default shell for the oracle user, enter the following command:

```
$ echo $SHELL
```

6. To run the shell startup script, enter one of the following commands:

- Bash shell:

```
$ . ~/.bash_profile
```

- Bourne or Korn shell:

```
$ . ~/.profile
```

- C shell:

```
% source ~/.login
```

7. If you are not installing the software on the local system, then enter a command similar to the following to direct X applications to display on the local system:

- Bourne, Bash, or Korn shell:

```
$ DISPLAY=local_host:0.0
```

- C shell:

```
% setenv DISPLAY local_host:0.0
```

In this example, *local_host* is the host name or IP address of the system to use to display Oracle Universal Installer (your workstation or PC).

8. If you determined that the /tmp directory has less than 400 MB of free disk space, then identify a file system with at least 400 MB of free space and set the TMP and TMPDIR environment variables to specify a temporary directory on this file system:

- a. To determine the free disk space on each mounted file system, use the following command:

```
# df -k
```

- b. If necessary, enter commands similar to the following to create a temporary directory on the file system that you identified, and set the appropriate permissions on the directory:

```
$ sudo mkdir /mount_point/tmp
$ sudo chmod a+wr /mount_point/tmp
# exit
```

- c. Enter commands similar to the following to set the TMP and TMPDIR environment variables:

- * Bourne, Bash, or Korn shell:

```
$ TMP=/mount_point/tmp
$ TMPDIR=/mount_point/tmp
$ export TMP TMPDIR
```

- * C shell:

```
% setenv TMP /mount_point/tmp
% setenv TMPDIR /mount_point/tmp
```

9. If you have had an existing installation on your system, and you are using the same user account to install this installation, then unset the ORACLE_HOME, ORACLE_BASE, ORACLE_SID, TNS_ADMIN environment variables and any other environment variable set for the Oracle installation user that is connected with Oracle software homes.

Enter the following commands to ensure that the ORACLE_HOME, ORACLE_BASE, ORACLE_SID and TNS_ADMIN environment variables are not set:

- Bourne, Bash, or Korn shell:

```
$ unset ORACLE_HOME
$ unset ORACLE_BASE
$ unset ORACLE_SID
$ unset TNS_ADMIN
```

- C shell:

```
% unsetenv ORACLE_HOME
% unsetenv ORACLE_BASE
% unsetenv ORACLE_SID
% unsetenv TNS_ADMIN
```

Use the following command to check the PATH environment variable:

```
$ echo $PATH
```

Ensure that the \$ORACLE_HOME/bin path is removed from your PATH environment variable.

-
-
10. To verify that the environment has been set correctly, enter the following commands:

```
$ umask
$ env | more
```

Verify that the `umask` command displays a value of 22, 022, or 0022 and the environment variables that you set in this section have the correct values.

13 Mounting the Product Disc

On most Linux systems, the disk mounts automatically when you insert it into the installation media. If the disk does not mount automatically, then follow these steps to mount it:

1. Enter a command similar to the following to eject the currently mounted disc, then remove it from the drive:

- Oracle Linux and Red Hat Enterprise Linux:

```
$ sudo eject /mnt/dvd
```

- SUSE Linux Enterprise Server:

```
# eject /media/dvd
```

In these examples, `/mnt/dvd` and `/media/dvd` are the mount point directories for the disc drive.

2. Insert the DVD into the disc drive.
3. To verify that the disc mounted automatically, enter a command similar to the following:

- Oracle Linux and Red Hat Enterprise Linux:

```
# ls /mnt/dvd
```

- SUSE Linux Enterprise Server:

```
# ls /media/dvd
```

4. If this command fails to display the contents of the disc, then enter a command similar to the following:

- Oracle Linux and Red Hat Enterprise Linux:

```
# mount -t iso9660 /dev/dvd /mnt/dvd
```

- SUSE Linux Enterprise Server:

```
# mount -t iso9660 /dev/dvd /media/dvd
```

In these examples, `/mnt/dvd` and `/media/dvd` are the mount point directories for the disc drive.

14 Installing Oracle Database

After configuring the `oracle` user's environment, start Oracle Universal Installer and install Oracle Database as follows:

1. Log on as the Oracle software owner user (typically, `oracle`) to the computer on which to install Oracle components.
2. If you are installing the software from installation media, then mount the disk if it is not mounted.
3. To start Oracle Universal Installer, enter the following command:

```
$ /mount_point/db/runInstaller
```

If Oracle Universal Installer does not start, then refer to *Oracle Database Installation Guide for Linux* for information about how to troubleshoot X Window display problems.

4. The following table describes the recommended action for each Oracle Universal Installer screen. Use the following guidelines to complete the installation:
 - If you need more assistance, or to choose an option that is not the default, then click **Help** for additional information.
 - If you encounter errors while installing or linking the software, then refer to *Oracle Database Installation Guide for Linux* for information about troubleshooting.

Note: If you have completed the tasks listed previously, then you can complete the installation by choosing the default values on most screens.

Screen	Recommended Action
Configure Security Updates	Enter your e-mail address, preferably your My Oracle Support e-mail address or user name in the Email field. You can select the I wish to receive security updates via My Oracle Support check box to receive security updates. Enter your My Oracle Support password in the My Oracle Support Password field. Click Next .
Select Installation Option	Select Create and configure a database from the following list of available options, then click Next : <ul style="list-style-type: none"> ■ Create and configure a database ■ Install database software only ■ Upgrade an existing database
System Class	Select Server Class from the following options to install the database, and click Next . <ul style="list-style-type: none"> ■ Desktop Class: Choose this option if you are installing on a laptop or desktop class system. ■ Server Class: Choose this option if you are installing on a server class system, such as what you would use when deploying Oracle in a production data center.

Screen	Recommended Action
Grid Installation Options	<p>Select Single instance database installation for the type of database installation you want to perform, and click Next.</p> <ul style="list-style-type: none"> ■ Single instance database installation: This option installs the database and the listener. ■ Real Application Clusters database installation: This option installs Oracle Real Application Clusters. ■ Oracle RAC One Node database installation: This option installs the Oracle RAC One Node database.
Select Install Type	<p>Select Typical Install as the installation type from the following options, and click Next:</p> <ul style="list-style-type: none"> ■ Typical Install: This installation method is selected by default. It lets you quickly install Oracle Database using minimal input. ■ Advanced Install: This installation method enables to perform more complex installations.
Typical Install Configuration	<p>Enter the following information according to your requirements:</p> <p>Oracle base: The Oracle base path appears by default. You can change the path based on your requirement.</p> <p>Software location: In the Software Location section, accept the default value or enter the Oracle home directory path in which you want to install Oracle components. The directory path should not contain spaces.</p> <p>Storage Type: Select File System, or Oracle Automatic Storage Management as the database storage option.</p> <p>Database file location: If you select File System as your storage type, then click Browse and specify a database file location.</p> <p>Database edition: Select the database edition to install.</p> <p>OSDBA Group: The OSDBA group is selected by default. You can also select the OSDBA group from the list.</p> <p>Global database name: Specify the Global Database Name using the following syntax:</p> <p><i>database_name.domain</i></p> <p>For example, <i>sales.us.example.com</i></p> <p>Administrative password: Enter the password for the privileged database account.</p> <p>Confirm Password: Reenter, and confirm the password for the privileged database account.</p> <p>Select the Create as Container database option to create the database as a multitenant container database (CDB) that can support one or more pluggable databases (PDBs). If you want Oracle Universal Installer to create a PDB when it creates the CDB, specify the PDB name in the Pluggable Database Name field.</p> <p>Click Next to continue.</p>
Create Inventory	<p>This screen is displayed only during the first installation of Oracle products on a system.</p> <p>Specify the full path of the Oracle Inventory directory. Ensure that the operating system group selected is <code>oinstall</code>. Click Next to continue.</p>

Screen	Recommended Action
Perform Prerequisite Checks	<p>Verify that all the prerequisite checks succeed, and then click Next.</p> <p>Oracle Universal Installer checks the system to verify that it is configured correctly to run Oracle software. If you have completed all the preinstallation steps in this guide, all the checks should pass.</p> <p>If a check fails, then review the cause of the failure listed for that check on the screen. If possible, rectify the problem and rerun the check. Alternatively, if you are satisfied that your system meets the requirements, then you can select the check box for the failed check to manually verify the requirement.</p> <p>Note: Oracle recommends that you use caution in checking the Ignore All option. If you check this option, then Oracle Universal Installer may not confirm if your system can install Oracle Database successfully.</p>
Summary	<p>Review the information displayed on this screen, and then click Install.</p> <p>Note: You can save all the installation steps into a response file by clicking Save Response File. Later, this file can be used for a silent installation.</p>
Install Product	<p>This screen displays the progress of a database installation. During this process, the Execute Configuration Scripts window appears. Do not click OK until you run the scripts mentioned in this screen as the root user. Click Next.</p> <p>This screen then displays the status information for the configuration assistants that configure the software and create a database.</p> <p>A message is displayed at the end of Database Configuration Assistant process. Review the database information, specially the Oracle Enterprise Manager Database Express URL, and click OK.</p>
Finish	<p>This screen is displayed automatically when all the configuration tools are successful.</p> <p>Click Close.</p>

15 Installing Oracle Database Examples

If you plan to use the following products or features, then download and install the products from the Oracle Database Examples media:

- Oracle JDBC Development Drivers
- Oracle Database Examples
- Oracle Text Knowledge Base
- Various Oracle product demonstrations

For information about installing software and various Oracle product demonstrations from the Oracle Database Examples media, refer to *Oracle Database Examples Installation Guide*.

16 What to Do Next?

To become familiar with this release of Oracle Database, it is recommended that you complete the following tasks:

- Log in to Oracle Enterprise Manager Database Express using a web browser.

Oracle Enterprise Manager Database Express 12c is a web-based management tool built into Oracle Database without any need for special installation or management. You can use Oracle Enterprise Manager Database Express to manage

a single Oracle Database installation. The default URL for Oracle Enterprise Manager Database Express is similar to the following:

`http://host.domain:1158/em/`

To log in, use the user name `SYS` and connect as `SYSDBA`. Use the password that you specified for this user during the Oracle Database installation.

- Refer to *Oracle Database Installation Guide for Linux* for information about required and optional postinstallation tasks, depending on the products to use.
- Refer to *Oracle Database Installation Guide for Linux* for information about how to use Oracle Enterprise Manager Database Express to learn about the configuration of your installed database.
- To learn more about using Oracle Enterprise Manager Database Express to administer a database, refer to *Oracle Database 2 Day DBA*.

17 Additional Information

This section contains information about the following:

- [Product Licenses](#)
- [Purchasing Licenses and Version Updates](#)
- [Contacting Oracle Support Services](#)
- [Locating Product Documentation](#)

Product Licenses

You are welcome to install and evaluate the products included in this media pack for 30 days under the terms of the Trial License Agreement. However, you must purchase a program license if you want to continue using any product after the 30 day evaluation period. See the following section for information about purchasing program licenses.

Purchasing Licenses and Version Updates

You can purchase program licenses and updated versions of Oracle products from the Oracle Store website:

<https://shop.oracle.com>

Contacting Oracle Support Services

If you have purchased Oracle Product Support, you can call Oracle Support Services for assistance 24 hours a day, seven days a week. For information about purchasing Oracle Product Support or contacting Oracle Support Services, go to the Oracle Support Services website:

<http://www.oracle.com/us/support/index.html>

Locating Product Documentation

Product documentation includes information about configuring, using, or administering Oracle products on any platform. The product documentation for Oracle Database products is available in both HTML and PDF formats online:

<http://docs.oracle.com/>

18 Documentation Accessibility

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

Access to Oracle Support

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

Oracle Database Quick Installation Guide, 12c Release 1 (12.1) for IBM: Linux on System z
E56895-04

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