




Upgrade to Oracle Database 12c Release 1 (12.1.02): UNIX

For Oracle Patch Set Release 12.1.0.2



Typographic Conventions

Table 1

Example	Description
<Example>	Angle brackets indicate that you replace these words or characters with appropriate entries to make entries in the system, for example, "Enter your <User Name>".
▶ Example ▶ Example ▸	Arrows separating the parts of a navigation path, for example, menu options
Example	Emphasized words or expressions
Example	Words or characters that you enter in the system exactly as they appear in the documentation
www.sap.com 	Textual cross-references to an internet address
/example	Quicklinks added to the internet address of a homepage to enable quick access to specific content on the Web
123456 	Hyperlink to an SAP Note, for example, SAP Note 123456 
<i>Example</i>	<ul style="list-style-type: none"> Words or characters quoted from the screen. These include field labels, screen titles, pushbutton labels, menu names, and menu options. Cross-references to other documentation or published works
Example	<ul style="list-style-type: none"> Output on the screen following a user action, for example, messages Source code or syntax quoted directly from a program File and directory names and their paths, names of variables and parameters, and names of installation, upgrade, and database tools
EXAMPLE	Technical names of system objects. These include report names, program names, transaction codes, database table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE
EXAMPLE	Keys on the keyboard

Document History

Caution

Before you start the implementation, make sure you have the latest version of this document. You can find the latest version at the following location:

▶ service.sap.com/instguides ▶ Database Upgrades ▶ Oracle ▶

The following table provides an overview of the most important document changes.

Table 2

Version	Date	Description
1.10	2015-10-22	Updated version
1.00	2015-03-31	Initial version for Oracle Database 12c

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1 Introduction

This documentation describes how to upgrade the Oracle database for the SAP system on the **UNIX** operating system to Oracle Database 12c Release 1 (12.1) using the Oracle Database Upgrade Assistant (DBUA):

If you are currently running 10.2.0.5, 11.2.0.2, 11.2.0.3, or 11.2.0.4, you can upgrade directly to 12.1.0.2, as described in SAP Note [1915315](#).

If you are running another Oracle database release, a direct upgrade to 12.1.0.2 is not supported. For more information, see docs.oracle.com/database/121/UPGRD/preup.htm#UPGRD12358.

For details on the support status of Oracle Database 10g Release 2, see SAP Notes [1110995](#) and [1654734](#).

For details on the support status of Oracle Database 11g Release 2, see SAP Notes [1431799](#), [1174136](#), and [2098258](#).

Note

This guide does **not** describe upgrades of Oracle databases with Real Application Clusters (RAC), Automatic Storage Management (ASM), or Oracle Engineered Systems. For more information on these upgrade types, see SAP Note [2064206](#).

Caution

Oracle Database 12c Release 1 (12.1) is only released and certified for SAP products running with SAP BASIS 7.00 and above, and SAP kernel release 7.21 EXT and above.

Implementation Considerations

- For more information about implementation considerations, including the most important SAP Notes for the upgrade, see [Planning \[page 11\]](#).
- Be sure to read the relevant SAP Notes before beginning the upgrade. These notes contain the most recent information about the upgrade, as well as corrections to the documentation. You can find the most recent version of the SAP Notes at service.sap.com/notes.
- You might find useful information for the upgrade in the following Oracle documentation:
 - *Complete Checklist for Upgrading to Oracle Database 12c Release 1 using DBUA (Oracle support document ID 1516557.1)*
You can find this at support.oracle.com/epmos/faces/DocumentDisplay?id=1516557.1.
 - *Master Note For Oracle Database 12c Release 1 (12.1) Database/Client Installation/Upgrade/Migration Standalone Environment (Non-RAC)) (Oracle support document ID 1520299.1)*
You can find this at support.oracle.com/epmos/faces/DocumentDisplay?id=1520299.1.
- You use the tools Oracle Universal Installer (OUI), MOPatch (Opatch), Oracle SQL*Plus, and Oracle Database Upgrade Assistant (DBUA) to perform the upgrade.

Naming Conventions

<DBSID> is the database name and <SAPSID> is the SAP system name.

<ora_swo> refers to the operating system (OS) account of the Oracle database software owner. The name of the software owner is either ora<dbSID> or oracle, depending on whether your user concept is SAP Classic or Oracle Standard. For more information, see SAP Note [1915323](#).

<ora_dba> refers to the OS account of the Oracle database administrator. For more information about user concepts, see SAP Note [1915323](#).

<new_Oracle_home> refers to the new Oracle home of release 12.1 from which the database is running after the upgrade.

1.1 New Features

For the complete list of new features of the Oracle Database 12c Release 1 (12.1), see the *New Features* documentation from Oracle at docs.oracle.com/database/121/NEWFT/toc.htm and SAP Note [1914631](#).

You can access the complete Oracle documentation at docs.oracle.com or www.oracle.com/pls/db121/homepage.

More Information

[Configuring the New Features for Oracle Database 12c Release 1 \(12.1\) \[page 39\]](#)

1.2 SAP Notes for the Upgrade

Make sure that you read the following SAP Notes:

Table 3

Number	Title	Remarks
1914631	Central Technical Note for Oracle Database 12c Release 1 (12.1)	Provides a starting point for information about Oracle 12c with multiple links to notes on Oracle 12c.
2086029	Oracle 12c: Additional Info / Corrections to Oracle 12c (12.1.0.2) Upgrade	Contains important late-breaking information on the upgrade
1915315	Database Upgrade Scripts for 12.1.0.2	Describes the shell and SQL upgrade scripts for 12c
1888485	Database Parameters for 12.1.0.2	Provides information about Oracle initialization parameters that need to be reset to their default values or that need to be removed
2086029	Oracle 12c: Additional Info / Corrections to Oracle 12c (12.1.0.2) Upgrade Guide	Contains additional information and corrections to the Oracle 12c upgrade guide for UNIX / Linux platforms <i>Upgrade to Oracle Database 12c Release 1 (12.1): UNIX</i>
1915299	Troubleshooting Software Installation for 12.1.0.2	Describes software installation problems and solutions or workarounds

Number	Title	Remarks
1915313	Current Patch Set for Oracle Database 12c Release 1 (12.1)	Describes the current Oracle patch set
1915316	Database: Patches for 12.1.0.2	Lists the status of Oracle patches and bundle patches for 12.1.0.2
819829	Oracle Instant Client Installation and Configuration on Unix	Describes the Oracle Instant Client Installation and Configuration
850306	Oracle Critical Patch Update Program	Describes the current Oracle security fixes
839182	Oracle patch installation with OPatch	Describes how to use OPatch with Oracle
1027012	MOPatch – Install Multiple Oracle Patches in One Run	Describes how to use MOPatch with Oracle – UNIX only
2087004	BR*Tools Support for Oracle 12c	Describes the support offered by BR*Tools for Oracle 12c
1915301	Oracle 12c: Database Software Installation on Unix	Describes installation of Oracle database software for UNIX and contains the current version of the SAP RUNINSTALLER installation scripts
1915314	Oracle 12c: Database Software Deinstallation	Describes how to deinstall Oracle 12c Release 1 (12.1) software
1521371	Setting of ORACLE_BASE in SAP Environments	Describes how to set ORACLE_BASE in an SAP environment
2064206	Database Upgrade to 12.1.0.2 with Grid Infrastructure	Describes the upgrade procedure for an Oracle RAC installation or an Oracle ASM installation on UNIX / Linux platforms
1777021	J2EE: Introducing Support for Oracle 12	Describes the required patch levels for Oracle 12c

1.3 More Information on SAP Service Marketplace

You can find more information as following on SAP Service Marketplace:

Table 4

Description	Internet Address	Title
SAP Notes	service.sap.com/notes	None
Oracle Database Administration	scn.sap.com/community/oracle SAP ON ORACLE KNOWLEDGE CENTER > SAP Documentation	<i>SAP Database Guide: Oracle</i>
SAP Software Distribution Center	support.sap.com/swdc	None

Description	Internet Address	Title
Oracle Database Upgrade Guide – that is, the guide you are now reading	▶ service.sap.com/instguides ▶ Database Upgrades ▶ Oracle	<i>Upgrade to Oracle Database <Version>: UNIX</i>
SAP support portal for Oracle database software, including patches	▶ support.sap.com/software/databases.html ▶ Oracle	<i>SAP Support Portal for Oracle Database Software</i>
Oracle database with SAP system	scn.sap.com/community/oracle	<i>SAP on Oracle</i>

2 Planning

➔ Recommendation

Before the production upgrade, make sure that you perform a test upgrade on your backup system.

1. You [check the original version of your database \[page 11\]](#).
2. You [check the hardware and software requirements \[page 11\]](#).
3. You [use the Oracle upgrade checklist for production use \[page 12\]](#).

2.1 Checking the Original Version of Your Database

You can check the original version of the database you want to upgrade and, if necessary, obtain more information. The database version is also checked later during the pre-upgrade phase.

Prerequisites

To upgrade directly to Oracle Database Release 12c, your source release must be Oracle Database 10g Release 2 (10.2.0.5) or Oracle Database 11g Release 2 (11.2.0.2, 11.2.0.3, or 11.2.0.4) If you are running another Oracle database release, a direct upgrade to 12.1.0.2 is not supported. For more information, see docs.oracle.com/database/121/UPGRD/preup.htm#UPGRD12358 ↗.

Process

To check the original version of your database, enter these commands from the environment of the source database as the appropriate database user:

```
SQL> select version from v$instance;
```

2.2 Checking Hardware and Software Requirements

You need to check that you meet the hardware and software requirements for running the new Oracle release, including the kernel parameters and shell limits.

Procedure

1. Check the complete list of hardware and software requirements for every platform included in the Oracle documentation, which you can find in chapter *Installation Checklist* in the Oracle Database Installation Guide 12c for your platform, available at docs.oracle.com/database/121/nav/portal_11.htm.

The hardware and software requirements are also checked in detail during the software installation phase.

You can access the complete Oracle documentation as a member of the Oracle Technology Network (OTN).

2. Check the Oracle-recommended kernel parameters and shell limits for your operating system with Oracle Database 12c Release 1 (12.1). The kernel parameters and shell limits are also checked in detail during the software installation phase.

These are only **recommendations** from Oracle for optimizing the system performance in production environments. If the recommended settings are not suitable for your system you must tune the kernel parameters accordingly.

You can obtain the recommended shell limits and kernel parameters from the relevant Oracle database **installation** guide for your operating system, available at:

www.oracle.com/technology/documentation

Select the appropriate documentation for Oracle Database 12c Release 1 (12.1).

2.3 Upgrade Checklist

You need to check the following items before starting the SAP system for production use of your upgraded system.

Prerequisites

For release 12.1.0.2, SAP supports the user concepts SAP Classic and Oracle Standard, as described in SAP Note [1915323](https://support.sap.com/1915323). You need to decide which user concept you want to deploy.

Procedure

➔ Recommendation

To reduce the complexity of the database upgrade and to reduce database downtime to a minimum, we strongly recommend you to perform the steps below where indicated **before** starting the actual [Oracle Database Upgrade \[page 24\]](#).

1. Specify your user concept and, if necessary, perform user migration (you can perform this step before starting the actual database upgrade):
 - If you decide on user concept Oracle Standard, migrate the Oracle software owner from `ora<dbSID>` to `oracle` as part of the upgrade preparation, as described in SAP Note [1915317](https://support.sap.com/1915317).
 - If you decide to stay with user concept SAP Classic, no user migration is needed. However, you can switch to the user concept Oracle Standard at any time after the upgrade if required.

2. Install the Oracle database software version 12.1.0.2, including the recommended patches.
For more information, see [Installation of Oracle Database Software \[page 17\]](#).
3. If your Oracle instant client is lower than version 11.2.0.4, install the version of the Oracle instant client that is currently recommended for Oracle 12c, which you can find in SAP Note [819829](#).
For more information, see [Updating the Oracle Instant Client \[page 34\]](#).
When upgrading from Oracle 11g to 12c, you can perform this step **before** starting the actual database upgrade.
4. Update BR*Tools to the version recommended for Oracle 12c, which is BR*Tools 7.40.
For more information, see [Updating BR*Tools \[page 35\]](#).
When upgrading from Oracle 11g to 12c, you can perform this step **before** starting the actual database upgrade.
5. Make sure that you have installed the SAP kernel supported with Oracle 12.1.0.2 and that you have a supported version of your operating system. In addition, make sure that you have installed the required support packages for the SAP kernel supported for Oracle 12c. For AS Java or AS ABAP+Java, see also SAP Note [1777021](#).
For more information, check the SAP requirements for your application or product in the Product Availability Matrix (PAM) at support.sap.com/pam.
Oracle Database 12c Release 1 (12.1) is only released and certified for SAP products running with SAP BASIS 7.00 and above, and SAP kernel release 7.21 EXT and above. Oracle 12.1 is only released and certified for Oracle client software version 11.2.0.4 or higher.
When upgrading from Oracle 11g to 12c, you can perform this step **before** starting the actual database upgrade.
6. Configure secure storage in file system (SSFS) for ABAP, otherwise the SAP System cannot start because it cannot connect to the database. In addition, consider the dependencies on the SAP kernel version.
For more information, see [Configuring Secure Storage in File System \[page 14\]](#).
When upgrading from Oracle 11g to 12c, you can perform this step **before** starting the actual database upgrade.

3 Preparation

You have to complete the following preparations:

1. You [download the software required for the upgrade \[page 14\]](#).
2. You [configure Secure Storage in File System \(SSFS\) \[page 14\]](#).
3. You [migrate to the Oracle Database Software Owner oracle \[page 15\]](#)
4. You [extract the Oracle software \[page 15\]](#).
5. You [check and, if necessary, set the DISPLAY environment variable \[page 16\]](#).
6. You [install the Oracle database software \[page 17\]](#).
7. You [run the pre-upgrade scripts \[page 22\]](#).

3.1 Downloading the Software for the Upgrade

You need to download various software packages to perform the upgrade.

Procedure

1. Download the Oracle Database 12c Release 1 (12.1) software, required patches, and Oracle 12.1 Instant Client software from:

▶ support.sap.com/software/databases.html ▶ Oracle ▶

2. Download the latest version of the DBATOOLS (BR*Tools) to be used immediately after the database upgrade from:

support.sap.com/swdc

BR*Tools supports the Oracle Database 12c Release 1 (12.1), as of release 7.40 (patch level 14). For more information, see SAP Note [2087004](#).

3.2 Configuring Secure Storage in File System

For an ABAP or dual-stack (ABAP+Java) system running on Oracle 12c, you must configure Secure Storage in File System (SSFS), otherwise the SAP system cannot start. If you are currently running Oracle version 10g or 11g, you can configure SSFS in advance to avoid extra effort during or after the database upgrade.

Prerequisites

For SSFS, you require at least SAP kernel 7.20 patch 210 (non-Unicode) or patch 98 and DBSL patch 102 or higher. However, for Oracle 12c, you require a higher minimum SAP kernel, as described in [Upgrade Checklist for Production Use \[page 12\]](#).

Procedure

1. Follow the procedure described in SAP Notes [1639578](#) and [1622837](#), which describe the configuration of SSFS in detail
2. Check that the environment variables from SSFS have been changed in the `.sapenv*` files of OS user `<sapsid>adm`.

3.3 Migrating to the Oracle Database Software Owner oracle

For Oracle release 12.1.0.2, SAP supports the user concepts SAP Classic and Oracle Standard, as described in SAP Note [1915323](#):

- If you decide on Oracle Standard, migrate the Oracle software owner from `ora<dbsid>` to `oracle` as part of the upgrade preparation, as described in SAP Note [1915317](#).
- If you decide to stay with SAP Classic, no user migration is needed.

For more information, see SAP Notes [1915323](#) and [1915317](#).

Procedure

1. Migrate the Oracle database software owner following the description in SAP Note [1915317](#), using the tools attached to the note.

3.4 Extracting Oracle Software

You need to verify the availability and correctness of the following Oracle directories:

- Oracle software `stage` directory
- Oracle inventory directory

Procedure

1. For the extraction of the software for Oracle Database 12c Release 1 (12.1.0.2), create the staging directory:

```
mkdir -p /oracle/stage/12102
chmod 755 /oracle/stage/12102
```


2. Ensure that the stage directories contain enough freespace for the extracted SAR files.
3. Use the SAP tool SAPCAR to extract all the RDBMS CDs to `/oracle/stage/12102`.

Example

For example, the following commands extract the database software:

```
cd /oracle/stage/12102
SAPCAR -xvf <RDBMS_DVD>/OR112164.SAR
SAPCAR -xvf <RDBMS_DVD>/OR212164.SAR
```

To upgrade a single instance database on the file system, you only need to extract the database software that is contained in the first 2 SAR files `OR112164.SAR` and `OR212164.SAR`

3.5 Checking and Setting the DISPLAY Environment Variable

You need to check and, if necessary, set the `DISPLAY` environment variable of the Oracle database software owner `<ora_swo>`.

Prerequisites

The setting of the `DISPLAY` environment variable is described in SAP Note [432861](#).

Procedure

1. Set the `DISPLAY` environment variable to `<host_name>:0.0`:

Table 5

Shell	Command
Bourne shell (sh)	<code>DISPLAY=<host_name>:0.0</code> <code>export DISPLAY</code>
C shell (csh)	<code>setenv DISPLAY <host_name>:0.0</code>
Korn shell (ksh)	<code>export DISPLAY=<host_name>:0.0</code>

Note

`<host_name>` is the host on which you want to display the GUI of the Oracle Universal Installer (OUI).

2. To make sure that the OUI screen can be displayed correctly on your system, you might have to start an X terminal (xterm) session and run the command:
`$ xhost +`
3. Check whether you can start an XTERM as the Oracle software owner `<ora_swo>`.

3.6 Installation of Oracle Database Software

As part of the preparations, you install the Oracle Database 12c software.

i Note

You can install the Oracle 12.1.0.2 database software into a new Oracle Home while the SAP system and the database are still running from the current Oracle home.

Process Flow

1. You [back up the central Oracle inventory](#) [page 17].
2. You [update the SAP RUNINSTALLER installation scripts](#) [page 18].
3. You [check the software installation prerequisites](#) [page 18].
4. You [installing the new Oracle database 12c software](#) [page 19].
5. You [install the current SAP bundle patch](#) [page 21].

3.6.1 Backing Up the Central Oracle Inventory

Before you install the new Oracle database patch set software, we recommend you to back up the central Oracle inventory.

Procedure

1. If the Oracle inventory exists, check its location by looking at the entry in one of the following files:
 - For example, AIX, HP-UX, Solaris SPARC: `/var/opt/oracle/oraInst.loc`
 - For example, Linux: `/etc/oraInst.loc`

The location is shown as follows:

```
inventory_loc=<path_to_Oracle_inventory>
```

2. Make a backup of your existing Oracle inventory before you start the Oracle Database 12c software installation by entering the following commands:

```
cd <path_to_Oracle_inventory>
```

```
cd ..
```

```
cp -r oraInventory oraInventory.<date>.SAVE
```

Alternatively, you can enter the following command:

```
zip -r oraInventory.zip oraInventory
```

3.6.2 Updating the SAP RUNINSTALLER Scripts

The SAP-specific installation scripts `RUNINSTALLER` and `12cinstall.sh` are located in directory `SAP` in the Oracle database software stage (that is, `/oracle/stage/12102/database/SAP`).

You need to check the patch level of the `RUNINSTALLER` and check in SAP Note [1915301](#) whether a higher version is available. If a higher version is available, we recommend that you update the Oracle installation scripts, which are attached to SAP Note [1915301](#). From there you can download the relevant package for your release. After you have extracted the Oracle software to the staging area, you need to update the installation scripts.

Procedure

Updating the Installation Scripts

1. Check the current version of `RUNINSTALLER` as the database software owner `<ora_swo>`:

```
cd /oracle/stage/12102/database/SAP
./RUNINSTALLER -version
```

2. If a higher patch level is available, download the newer version in SAP Note [1915301](#), following the instructions there.

3.6.3 Checking the Software Installation Prerequisites

You must check the prerequisites – releases, patches, kernel parameters – for the Oracle software installation.

Prerequisites

If you are performing `RUNINSTALLER` in dialog mode, make sure that the `DISPLAY` environment variable is set correctly, as described in [Checking and Setting the DISPLAY Environment Variable \[page 16\]](#).

Procedure

1. Log on as the Oracle database software owner `<ora_swo>`.
2. For `RUNINSTALLER`, you need to set the following environment variables:
 - `DISPLAY` – only for dialog mode, that is, when `-silent` is **not** used
 - `DB_SID`
3. Perform the following commands in dialog or silent mode to check the `RUNINSTALLER` version:
 - Dialog mode:

```
cd /oracle/stage/12102/database/SAP
./RUNINSTALLER -check
```
 - Silent mode:

```
cd /oracle/stage/12102/database/SAP
./RUNINSTALLER -check -silent
```

4. Apply missing OS patches and OS packages and set OS kernel parameters as recommended by the OUI. On the verification results page, note which checks failed. You can fix some of these failed checks by running a fix script generated by the OUI when you click *Fix & Check again*.

5. Only valid for: AIX |

On AIX, call the script `rootpre.sh` as user `root`:

```
/oracle/stage/12102/database/rootpre.sh
```

End of: AIX |

3.6.4 Installing the New Oracle Database 12c Software

For more information about the current patch set, see SAP Note [1915313](#).

For more information about how to install Oracle Database Release 12.1 software, see SAP Note [1915301](#).

During the software installation of Oracle 12c use the new recommended `ORACLE_BASE/oracle/<DBSID>`.

Procedure

1. Log on as the Oracle database software owner `<ora_swo>`.
2. Change to the `stage` directory:

```
cd /oracle/stage/12102/database/SAP
```
3. Make sure that the `DISPLAY` (for dialog mode) and `DB_SID` variables are set in the environment.
4. Start the OUI with the Oracle database software owner, user `<ora_swo>`, as follows:

```
./RUNINSTALLER
```

For silent operation, enter this command:

```
./RUNINSTALLER -oracle_base /oracle/<DBSID> -silent -nocheck
```


For more information on further options, see SAP Note [1915301](#).

5. Respond to the OUI as follows:

Table 6

Prompt or Condition	Action
<i>Configure Security Updates</i>	Do not select the checkbox. The runInstaller issues a warning. Choose <i>Next</i> and then <i>Yes</i> .
<i>Select Installation Option</i>	Confirm the pre-selected default <i>Install database software only</i> by choosing <i>Next</i> .
<i>Grid Installation Options</i>	Confirm the default selection <i>Single Instance database installation</i> and then choose <i>Next</i> .
<i>Select Product Language</i>	Confirm the default option <i>English</i> and then choose <i>Next</i> .

Prompt or Condition	Action
<i>Select Database Edition</i>	Confirm the default option <i>Enterprise Edition</i> and then choose <i>Next</i> .
<i>Specify Installation Location</i>	<p>This screen displays the value of ORACLE_BASE, which is set in the environment, and which should be /oracle/<DBSID>.</p> <p>This screen also displays the value of ORACLE_HOME, which should be /oracle/<DBSID>/<release>, and ORACLE_BASE, which should be /oracle/<DBSID>.</p> <p>See SAP Note 1521371 for more information on setting ORACLE_BASE for your configuration.</p> <p>Select <i>Next</i>.</p> <p>If you see the following error message from the OUI, you can safely ignore it and continue with the installation:</p> <pre>[INS-32008] Oracle base location can't be same as user home directory</pre>
<i>Privileged Operating System Groups</i>	<p>This screen displays the operating system groups:</p> <ul style="list-style-type: none"> • OSDBA:dba • OSOPER:oper • OSBACKUPDBA:oper • OSDGDBA:dba • OSKMDBA:dba <p>Leave the default and continue with <i>Next</i>.</p>
<i>Perform Prerequisite Checks</i>	<p>This screen checks if all the required system prerequisites for installation of the database software have been met. If some of the checks are displayed as <i>Failed</i>, you can fix these problems by choosing <i>Fix & Check Again</i>.</p> <div style="background-color: #fff9c4; padding: 10px; border: 1px solid #ccc;"> <p>➔ Recommendation</p> <p>We strongly recommend you to make sure that there are no failed checks before starting the software installation.</p> </div> <p>If not all prerequisites are met and you decide to ignore the warnings about failed checks, you later see the OUI warning [INS-13016].</p>
<i>Summary</i>	Review the information displayed on this screen and choose <i>Install</i> .
<i>Finish</i>	<p>Finish the software installation by executing the <code>root.sh</code> script as the <code>root</code> user from another session.</p> <p>If <code>root.sh</code> prompts you that a file (<code>dbhome</code>, <code>oraenv</code>, <code>coraenv</code>) already exists, allow <code>root.sh</code> to overwrite it so that the new version is copied.</p> <p>If this is the first Oracle product you have installed on this host, also run the <code>oraInstroot.sh</code> script from the central inventory as follows:</p> <pre>\$Oracle_Home/oraInventory/oraInstRoot.sh</pre>

Prompt or Condition	Action
	 Example If you are using <code>sudo</code> to change to a <code>root</code> user, you run the following command: <pre><code>/usr/local/bin/sudo \$ORACLE_HOME/oraInventory/ oraInstRoot.sh</code></pre>

6. To exit the OUI, choose *Exit* and confirm the dialog box that appears.

In the event of error during the software installation, see the troubleshooting information in SAP Note [1915299](#).

Result

The Oracle 12c database software is now installed. The installation location is referred to – for example, in SAP Notes – as Installation Oracle Home <IHRDBMS>.

Example

```
/oracle/<DBSID>/12102
```

3.6.5 Installing the Current SAP Bundle Patch

After the installation of the Oracle Database patch set, you need to install the current (or latest) SAP bundle patch (SBP) into the new Oracle home.

The SBP also delivers a set of upgrade scripts that automate most of the pre-upgrade and post-upgrade tasks.

Prerequisites

Check SAP Note [1914631](#) to find a cross-reference to the current SAP Note with the list of required patches to be installed. You must install the SBP using the Oracle tool MOPatch. For more information about MOPatch, see SAP Note [1027012](#).

Procedure

1. Download the required patches.
2. Log on as the Oracle database software owner <ora_swo>.
3. Install the SBP into the new Oracle home according to the instructions in the SBP README file.

Note

The installation of the SBP consists of these steps:

1. The installation of the SBP software into the Oracle home.
This step must be completed before the database is upgraded.
2. The change of the database structure and database properties (dictionary, parameter, and properties)
This step must be done immediately after the database has been upgraded. For more information, see *Performing SAP Bundle Patch Post-Installation Steps*.

3.7 Running the Pre-Upgrade Scripts

You run the Oracle pre-upgrade scripts, which automatically perform various tasks and checks on your database. See SAP Note [1915315](#).

The scripts do the following on your pre-upgrade database:

- Provide information on the database
- Suggest any changes that you need to make to the database before you start the upgrade
- Perform some of the pre-upgrade tasks on the database

You can run the pre-upgrade scripts as often as necessary.

i Note

You always execute these pre-upgrade scripts as the Oracle database administrator `<ora_dba>`. It is recommended to use `ora<dbSID>` or `sapsid<adm>` since the Oracle environment is already set for these users.

If you use Oracle software owner `oracle` for this task, you must first set the environment. For more information, see SAP Note [1915315](#).

Prerequisites

- The directory where the upgrade scripts are installed is called `ora_upgrade`.
- The scripts are installed as part of the SAP bundle patch into the following directory of the new Oracle Home:
`<new_Oracle_home>/sap/ora_upgrade`
- The database is running.

Procedure

1. Log on as the Oracle database administrator `<ora_dba>`.
2. Change to the correct directory by entering the relevant command:
`cd /oracle/<DBSID>/12102/sap/ora_upgrade/pre_upgrade`
3. Execute the following commands to perform pre-upgrade tasks, which can improve the performance of the upgrade process:
`sqlplus / as sysdba`

```
SQL> @pre_upgrade_tasks.sql
```

4. Execute the following commands to check the pre-upgrade status of your database:

```
sqlplus / as sysdba
```

```
SQL> @pre_upgrade_checks.sql
```

Result

Follow the recommendations and instructions. However, you can safely ignore warnings about the setting of database parameter `remote_os_authent=TRUE`.

Caution

When you upgrade from Oracle 10g and parameter `COMPATIBLE` is set to a value < 11 , do **not** change this parameter before the upgrade from 10.2 to 12c although this is recommended by the pre-upgrade script. This parameter is automatically adapted during the upgrade by the DBUA and SAP-specific upgrade scripts.

4 Oracle Database Upgrade

This section describes how to upgrade the Oracle database.

1. You [back up the Oracle database \[page 24\]](#).
2. You [shut down the SAP system \[page 24\]](#).
3. You [upgrade the database structure \[page 25\]](#).

i Note

If you have problems during the upgrade, see SAP Note [2086029](#).

4.1 Backing Up the Oracle Database

You **must** have a **complete and usable** database backup otherwise you might lose data if the upgrade fails.

Procedure

1. Create a complete database backup.
2. Check that the backup is usable. If for any reason you have problems during the upgrade you must be able to restore the database from this backup.

4.2 Shutting Down the SAP System

You need to shut down the SAP system.

Procedure

Stop the SAP application instances by entering the following command as user <sapsid>adm:

```
stopsap r3
```

You can also stop the SAP application server with the `sapcontrol` tool:

```
sapcontrol -nr <SAP_instance_number> -function Stop
```

i Note

Make sure that processes that log on to the database, such as CRON jobs, are not active during the upgrade. Make sure that you reschedule these processes when the upgrade has finished.

4.3 Upgrading the Database Structure with the Database Upgrade Assistant

To upgrade the database structure, you need to start the Oracle Database Upgrade Assistant (DBUA). The DBUA is a graphical tool that leads you step-by-step through the upgrade.

Prerequisites

- You have [installed the database software \[page 17\]](#).
- Make sure that the `DISPLAY` environment variable is correctly set, as described in [Checking and Setting the DISPLAY Environment Variable \[page 16\]](#).
- Make sure that the software owner `<ora_swo>` has write permissions (664) on the `oratab` file, which is either `/etc/oratab` or `/var/opt/oracle/oratab`, depending on your operating system.
- Make sure that `oratab` contains the entry `<DBSID>:<Oracle_home>:N`

Example

- Oracle 11g: `OQ1:/oracle/OQ1/112_64:N`
- Oracle 10g: `OQ1:/oracle/OQ1/102_64:N`

- Make sure that the database and the Oracle Listener are both running.

Procedure

1. Log on as Oracle software owner `<ora_swo>`:
 - With user concept Oracle Standard, the software owner is `oracle`.
 - With user concept SAP Classic, the software owner is `ora<dbSID>`.

2. Make a backup of directory `<Oracle_home>/network/admin` as follows:

```
cp -r <old_Oracle_home>/network/admin <old_Oracle_home>/network/admin.SAVE
```

3. Start the DBUA.

`dbua.sap.sh` is a wrapper script to automate most of the upgrade and post-upgrade tasks.

To run the upgrade with this script, you have to set the environment variables `ORACLE_HOME_SRC` and `ORACLE_HOME_TGT`, `DB_SID`, and `ORACLE_BASE`:

1. Set `ORACLE_HOME_SRC` and `ORACLE_HOME_TGT`.

Example

- Enter these commands to upgrade from 10.2.0.5 to 12.1.0.2:

```
export ORACLE_HOME_SRC=/oracle/<DBSID>/102_64  
export ORACLE_HOME_TGT=/oracle/<DBSID>/12102  
export DB_SID=<DBSID>  
export ORACLE_BASE=/oracle/<DBSID>
```
- Enter these commands to upgrade from 11.2.0.x to 12.1.0.2:

```
export ORACLE_HOME_SRC=/oracle/<DBSID>/112_64
export ORACLE_HOME_TGT=/oracle/<DBSID>/12102
export DB_SID=<DBSID>
export ORACLE_BASE=/oracle/<DBSID>
```

2. Change to the correct directory:

```
cd $ORACLE_HOME_TGT/sap/ora_upgrade/post_upgrade
```

3. Run this script in query mode initially to verify that the environment for the upgrade is correct:

```
./dbua.sap.sh -q
```

4. Run this script as follows to perform the upgrade:

- For interactive mode, enter the following command:

```
./dbua.sap.sh
```

i Note

Due to Oracle bug 19897084, you must make sure that the `oratab` contains the corresponding entry for the database you want to upgrade, `<DBSID>:<Oracle_home>:N`. This is especially necessary if you run DBUA in non-silent mode.

This is an example of such an entry:

```
OQ1:/oracle/OQ1/112_64:N
```

- For silent mode, enter the following command:

```
./dbua.sap.sh -silent
```

For more information on how to use `dbua.sap.sh`, see SAP Note [1915315](#) or run `dbua.sap.sh -help`.

4. Respond appropriately to the DBUA dialogs (unless DBUA is started in silent mode):

- On the *Select Operation* screen, select *Upgrade Oracle Database* and *Next*.
- On the *Select Database* screen, select your database to upgrade and *Next*.

If you use the wrapper script `dbua.sap.sh`, the database is already pre-selected.

The DBUA now retrieves all information from the database that is required for the upgrade. Then DBUA runs the upgrade prerequisite checks.

➔ Recommendation

If the DBUA warns you of issues that need to be fixed before the upgrade, you need to analyze and act on these warnings. The most common messages are as follows:

Table 7

Warning Message	Explanation or Solution
Warning message: <i>Database contains schemas with stale optimizer statistics</i>	Solution: Run the following command: brconnect -u / -c -f stats -t oradict_stats
Warning message: <i>Database contains INVALID objects prior to upgrade</i>	Solution: To recompile any invalid objects, use SQL*Plus to execute the script <code>\$ORACLE_HOME/rdbms/admin/utlrlp.sql</code> .

Warning Message	Explanation or Solution
	<p>Any invalid SYS/SYSTEM objects found before upgrading the database are stored in table <code>registry\$sys_inv_objs</code></p> <p>Any invalid non-SYS/SYSTEM objects found before upgrading the database are stored in table <code>registry\$nonsys_inv_objs</code>.</p> <p>After the upgrade, run <code>ORACLE_HOME/rdbms/admin/utluiobj.sql</code> to identify any new invalid objects due to the upgrade.</p>

3. On the *Upgrade Options* screen, select the following fields:
 - *Recompile invalid objects*
 - *Upgrade Timezone Data*

If required, you can check the following:

- *Gather statistics before the upgrade* (takes some time)
- *Set User Tablespaces to Read Only*

Caution

Do **not** change the database directories *Diagnostic Destination* and *Audit File Destination*.

The customer SQL Scripts page lists all SAP-specific SQL scripts that are run as part of the post-upgrade steps.

4. On the *Management Options* screen, you can select whether you want to register the database with EM Cloud Control or EM Database Express. By default, EM Database Express is selected. Deselect it so that both options are not selected.
 5. On the *Move Database Files* screen, do **not** select any of the checkboxes.
 6. On the *Network Configuration* screen, you can decide whether you migrate the database listener to the new Oracle Home. By default, the database listener is migrated using the same name and same port to the new Oracle Home. As part of this migration, `tnsnames.ora`, `sqlnet.ora`, and `listener.ora` are automatically copied and configured.
 7. On the *Recovery Options* screen, you can tell the DBUA how to recover in the event of an upgrade error. For SAP databases we suggest that you select *I have my own backup* as you should already have your own backup strategy. Choose *Next*.
 8. On the *Summary* screen, review the *Database Upgrade Summary*. If you are satisfied with the summary, click *Finish* to start the upgrade.
 9. On the *Progress* screen, you can follow the upgrade progress of the DBUA. You can optionally open the *Alert Log* or *Activity Log* window. You can drill down into the upgrade steps to check their progress by clicking the arrows.

You might get the warning `ORA-32006: REMOTE_OS_AUTHENT initialization parameter has been deprecated`. You can ignore this warning.

When the progress bar shows 100%, the upgrade is complete.
 10. Click on *Upgrade Results* to see the results of the upgrade.
 11. On the *Results* screen, after reviewing the upgrade results, click *Close* to close the DBUA.
 12. Optionally, delete the environment variables `ORACLE_HOME_SRC` and `ORACLE_HOME_TGT`.
5. **Make sure that the database instance has stopped after the upgrade.**

5 Post-Upgrade Steps

After the Oracle database upgrade, you need to perform the steps described here.

1. You [update oratab](#) [page 29].
2. You [update the SQL*Net configuration files](#) [page 29].
3. You [check the symbolic link for the runtime Oracle home](#) [page 30].
4. You [adapt the environment of the <sapsid>adm user](#) [page 31].
5. You [adapt the environment of the ora<dbsid> user](#) [page 31].
6. You [start the listener process](#) [page 32].
7. You [start the database instance](#) [page 32].
8. You [perform the post-installation steps for the SAP bundle patch](#) [page 32].
9. You [perform post-upgrade checks](#) [page 33].
10. You [perform post-upgrade tasks](#) [page 33].
11. You [update the Oracle Instant Client](#) [page 34].
12. You [update BR*Tools](#) [page 35].
13. You [back up the database](#) [page 37].
14. If required and not yet done, [update the SAP executables](#) [page 37].
15. If not yet done, [configure the Secure Storage in the File System \(SSFS\)](#) [page 14].
16. For systems with Java components – AS Java or AS ABAP+Java – [update the JDBC driver references](#) [page 37].
17. You [restart the SAP system](#) [page 38].
18. You [configure the new features for Oracle Database 12c Release 1 \(12.1\)](#) [page 39].
19. If not already done, you migrate from software owner `ora<dbsid>` to software owner `oracle`, as described in [Migrating to the Oracle Database Software Owner oracle](#) [page 15].
20. You [deinstall the old Oracle Home](#) [page 39].
21. You follow the instructions in SAP Note [2157904](#). Otherwise you might run into Oracle error ORA-39726 (Unsupported add / drop column operation on compressed tables) when adding additional fields to a table. This might occur when you import Support Packages or when you manually add fields in transaction SE11.
22. You make sure that you have installed the required support packages for the SAP kernel supported for Oracle 12c. For AS Java or AS ABAP+Java, see also SAP Note [1777021](#).

i Note

Make sure that you have installed the required SAP Bundle Patch. For more information, see [Installing the Required SAP Bundle Patch](#) [page 21].

5.1 Updating oratab

Procedure

1. After the database upgrade, change the entry `<DBSID>:/oracle/<DBSID>/12102:N` in `/etc/oratab` or `/var/opt/oracle/oratab` so that it now looks as follows:

```
<DBSID>:/oracle/<DBSID>/121:N
```

For more information, see SAP Note [1915315](#).

5.2 Updating the SQL*Net Configuration Files

You need to adapt the SQL*Net files that are located in the directory `<ORACLE_HOME>/network/admin` and in the directory (server) pointed to by the environment variable `TNS_ADMIN` (client), for example, under `/usr/sap/<SID>/SYS/profile/oracle`.

i Note

DBUA modifies the `SQLNET` profiles in the directory `<ORACLE_HOME>/network/admin`.

Procedure

1. Check and, if necessary, add the following entries in the `tnsnames.ora` file located at `<ORACLE_HOME>/network/admin` and `$TNS_ADMIN`:

```
LISTENER_<DBSID>.WORLD = (ADDRESS = (COMMUNITY = SAP.WORLD) (PROTOCOL = TCP) (HOST = <hostname>) (PORT = <listener_port>))
```

```
LISTENER_<DBSID> = (ADDRESS = (COMMUNITY = SAP.WORLD) (PROTOCOL = TCP) (HOST = <hostname>) (PORT = <listener_port>))
```

The easiest method to do this is to just copy the complete `LISTENER_<DBSID>` entry from the file `<OLD_ORACLE_HOME>/network/admin/tnsnames.ora` and add this entry unchanged to the file in `<ORACLE_HOME>/network/admin` and `$TNS_ADMIN/tnsnames.ora` on the SAP side

When the database instance is started, this entry is used to resolve the parameter `local_listener`. For recommendations on setting `local_listener`, see SAP Note [1888485](#).

i Note

Although this entry is only needed on the database server or on central systems where the `startdb` or `stopdb` scripts are used, it is recommended to repeat the change described above on all application servers. Without this entry, the `startdb` or `stopdb` script fails with the following error message:

```
ORA-00119: invalid specification for system parameter LOCAL_LISTENER
```

2. Check that the following parameters are configured in `listener.ora`:
 - `SID_LIST_<LISTENER_NAME>`
 - `ADR_BASE_<LISTENER_NAME>`

If they are missing, copy them from the `listener.ora` from the source Oracle home `<OLD_ORACLE_HOME>` and check that Oracle home in `listener.ora` is set to `<NEW_ORACLE_HOME>`.

Example

```
<LISTENER_NAME>=LISTENER_<DBSID>
ADR_BASE_<LISTENER_NAME>=/oracle/<DBSID>/saptrace
SID_LIST_<LISTENER_NAME> =
(SID_LIST =
(SID_DESC =
(SID_NAME = <DBSID>)
(ORACLE_HOME = /oracle/<DBSID>/121)
)
)
```

When the database instance is started, this entry is used to resolve the parameter `local_listener`. For recommendations on setting `local_listener`, see SAP Note [1888485](#).

3. Only valid for SAP systems running the SAP Java stack:

When upgrading an SAP 7.0X system with AS Java or dual-stack (ABAP+Java), add the parameter `SQLNET.ALLOWED_LOGON_VERSION_SERVER = 8` to `SQLNET.ora` on the database server in directory `<ORACLE_HOME>/network/admin` **and** on the SAP application server(s) in the directory `$TNS_ADMIN`.

Without the entry in `SQLNET.ora`, the following error occurs:

```
ORA-28040: No Matching authentication
```

5.3 Checking the Symbolic Link for Runtime Oracle Home

For upgrades from 10.2 to 12.1.0.2 or 11.2 to 12.1.0.2, the symbolic link `/oracle/<DBSID>/121` has already been created by `RUNINSTALLER`.

Procedure

1. Change to the required directory:

```
cd /oracle/<DBSID>
```

2. Check that the following symbolic link exists:

```
ls -l /oracle/<DBSID>/121
```

3. If this link does not exist, create a symbolic link to the new Oracle home:

```
ln -s /oracle/<DBSID>/12102 /oracle/<DBSID>/121
```

5.4 Adapting the Environment of the <sapsid>adm user

You have to change the environment of user <sapsid>adm for SAP application servers that are installed on the Oracle database server. You need to make sure that the changes you made to the Oracle user environment are permanently stored in the profiles `.cshrc`, `.dbenv_hostname.csh`, `.dbenv_hostname.sh`, and `.dbenv.csh`.

Procedure

1. Log on as user <sapsid>adm and adapt the variables listed below in the `.dbenv*` files.
2. Set the `ORACLE_HOME` environment variable to new Oracle home, for example:

```
/oracle/<DBSID>/121
```

3. Set `ORACLE_BASE` to the new Oracle base `/oracle/<DBSID>`.
4. Adapt the `PATH` variable so that it no longer contains references to the old Oracle home.
5. Check the environment with:

```
$ env | grep ORACLE_HOME
```

```
$ env | grep ORACLE_BASE
```

```
$ env | grep PATH (this should no longer contain a reference to 112_64)
```

i Note

Make sure that the environment does not contain any variables that still refer to the old database release.

5.5 Adapting the Environment of the ora<dbsid> User

You have to change the environment of user `ora<dbsid>`. You need to make sure that the changes you made to the Oracle user environment are permanently stored in the profiles `.cshrc`, `.dbenv_hostname.csh`, `.dbenv_hostname.sh`, and `.dbenv.csh`.

Procedure

1. Log on as user `ora<dbsid>` and adapt the variables listed below in the `.dbenv*` files.
2. Set the `ORACLE_HOME` environment variable to the new Oracle home, for example:
`/oracle/<DBSID>/121.`
3. Set `ORACLE_BASE` to the new Oracle base `oracle/<DBSID>`.
4. Change the `PATH` variable so that it no longer contains references to the old Oracle home.
5. After you have made these changes, log on as `ora<dbsid>` and verify the environment by entering the following commands:

```
$ env | grep ORACLE_HOME
```

```
$ env | grep ORACLE_BASE
```

```
$ env | grep PATH (this should no longer contain a reference to 112_64).
```

i Note

Make sure that the environment does not contain any variables that still refer to the old database release.

5.6 Starting the Listener

You start the Oracle database listener.

Procedure

1. Log on as follows:
 - User concept SAP Classic
Log on as `ora<dbSID>`.
 - User concept Oracle Standard
Log on as `ora<dbSID>` or as `oracle`.For more information, see SAP Note [1915317](#).
2. Start the listener with the following command:

```
lsnrctl start <listener name>
```

5.7 Starting the Database Instance

You start the Oracle database instance.

Procedure

1. Log on as the Oracle database administrator `<ora_dba>`.
2. Start the database by entering the following commands:

```
sqlplus / as sysdba
```

```
SQL> startup
```

5.8 Performing SAP Bundle Patch Post-Installation Steps

You have installed an SAP bundle patch (SBP) before you upgraded to the new Oracle Release. Now you need to run the SBP post-installation steps.

Procedure

1. Run the SBP post-installation instructions as described in the corresponding SBP README.

5.9 Performing Post-Upgrade Checks

You run the SAP-specific database post-upgrade check scripts.

i Note

You always execute these post-upgrade scripts as Oracle database administrator `<ora_dba>`. It is recommended to use `ora<dbid>` or `sapsid<adm>` as for these users the Oracle environment is already set. If you use Oracle software owner `oracle` for this task, you must first set the environment, as described in SAP Note [1915315](#).

Procedure

1. Log on as the current Oracle database administrator `<ora_dba>`.
2. Open a command prompt and change to the directory `<new_Oracle_home>/sap/ora_upgrade/post_upgrade`.
3. From the same directory, start `sqlplus.exe` and enter the following commands to run the post-upgrade scripts, referring to SAP Note [1915315](#):

```
sqlplus / as sysdba
```

```
SQL> @?\rdbms\admin\utlu121s.sql
```

```
SQL> @post_upgrade_tasks.sql (if you have not already executed this with DBUA)
```

```
SQL> @post_upgrade_checks.sql
```

This provides an overview of the status of the upgraded database.

5.10 Performing Post-Upgrade Tasks

You need to perform certain post-upgrade tasks as `<sapsid>adm`.

Procedure

i Note

When you use SecureStore for the BR*Tools, replace the `-u /` in the `brconnect` commands below with `-u //`. For example, use `brconnect -u // -c -f stats -t system_stats` instead of `brconnect -u / -c -f stats -t system_stats`.

1. Gather Oracle optimizer statistics by executing the following commands as the administration user `<sapsid>adm`:

```
brconnect -u / -c -f stats -t system_stats
```

```
brconnect -u / -c -f stats -t oradict_stats
```

i Note

You can perform this step later if required.

2. Check the Oracle database parameters against SAP Note [1888485](#) and adjust them if necessary.
Check SAP Note [1171650](#) to see whether an automated script for Oracle 12c is already available. This helps you check whether your SAP system complies with the database parameter recommendations at any given point in time.
3. Update the Oracle database statistics with BRCONNECT as follows:

```
brconnect -u / -c -f stats -t all -f collect -p 4
```

For more information about update statistics, see the documentation *SAP Database Guide: Oracle* at:

► scn.sap.com/community/oracle ► *SAP ON ORACLE KNOWLEDGE CENTER* ► *SAP Documentation* ►

i Note

You can perform this step later if required.

5.11 Updating the Oracle Instant Client

After the upgrade to Oracle 12.1.0.2, it is strongly recommended to install an Oracle client supported for Oracle 12c. If it is not possible to install Oracle client 12.1.0.2 (for example, due to SAP limitations or hardware restrictions), you need at least Oracle client 11.2.0.4.

For more information on the recommended versions, see the Product Availability Matrix (PAM) at support.sap.com/pam and SAP Note [819829](#). A mixture of Oracle client 12.1.0.2 and Oracle client 11.2.0.4 on different application servers is supported.

Procedure

1. As user `<sapsid>adm`, update the Oracle instant client for UNIX as follows, either for the Oracle 12c client or the Oracle 11g client:

i Note

For more information, see SAP Note [819829](#).

Installation of Oracle 12c Client

1. Create the new client directory:

```
mkdir -p /oracle/client/12x
```
2. Change to the new client directory:

- ```
cd /oracle/client/12x
```
- Mount the Oracle client DVD 12.1.0.2 and unpack the client software:
 

```
SAPCAR -xvf <Oracle client DVD>/OCL<your OS>/OCL12164.SAR
```
  - Check and create the symbolic links:
 

```
cd /oracle/client/12x
```

```
ln -s instantclient_12102 instantclient
```
  - Create the symbolic link for BR\*Tools 7.40:
    - Enter this command to change directory:
 

```
cd /oracle/client
```
    - If the link or directory 11x\_64 already exists, rename it, as in this example:
 

```
mv 11x_64 11x_64_save
```
    - Create the symbolic link:
 

```
ln -s /oracle/client/12x /oracle/client/11x_64
```

### Installation of Oracle 11g Client

- Create the new client directory if it does not already exist:
 

```
mkdir -p /oracle/client/11x_64
```
- Change to the new client directory
 

```
cd /oracle/client/11x_64
```
- Mount the Oracle client DVD 11.2.0.4 and unpack the client software:
 

```
SAPCAR -xvf <Oracle client DVD>/OCL<your OS>/OCL11264.SAR
```
- Check and create the symbolic links:
 

```
cd /oracle/client/11x_64
```

```
ln -s instantclient_11204 instantclient
```
- Adapt the environment of user <sapsid>adm and ora<sid> to make sure that the change to the new Oracle client directory environment variable LD\_LIBRARY\_PATH, SHLIB\_PATH or LIBPATH is permanently stored in the profiles such as .dbenv\_<hostname>.csh, .dbenv\_<hostname>.sh, .dbenc.csh, or dbenv.sh. This means that you need to replace /oracle/client/11x\_64 ... or /oracle/client/10x\_64 with /oracle/client/12x... or /oracle/client/11x\_64...
- Log out and log on again as the <sapsid>adm or ora<dbsid> user.






## 5.12 Updating BR\*Tools

You update BR\*Tools to the latest release, with the latest patch level. For more information, see SAP Notes [2087004](#), [12741](#), and [1598594](#).


### **i** Note

You can also update BR\*Tools as described here during the preparation phase.

## Procedure

1. Download the most current version of BR\*Tools from [support.sap.com/swdc](https://support.sap.com/swdc)  [Software Downloads](#) [Support Packages and Patches](#) [Browse Download Catalog](#) [Additional Components](#) [SAP Kernel](#) [SAP KERNEL <platform>](#) [SAP KERNEL <version>](#) [<Platform>](#) [ORACLE](#) [DBATLxxxx.SAR](#) , following the descriptions in SAP Notes [2087004](#)  and [12741](#) , and adapt the permissions as described in SAP Note [1598594](#) .

2. Only valid for: AIX |

For AIX 6.1 or higher, enter the settings for all BR executables for AIX RBAC (Role-Based Access Control), as described in SAP Note [1598594](#) .

Enter the settings for the following paths:

- /usr/sap/<SID>/SYS/exe/run
- /sapmnt/<SID>/exe
- /sapmnt/<SID>/exe/uc|nuc/platform



### Example

```
setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /usr/sap/Q01/SYS/exe/run/brarchive

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /usr/sap/Q01/SYS/exe/run/brbackup

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /usr/sap/Q01/SYS/exe/run/brconnect

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /usr/sap/Q01/SYS/exe/run/brrecover

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /usr/sap/Q01/SYS/exe/run/brrestore

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /usr/sap/Q01/SYS/exe/run/brspace

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /sapmnt/Q01/exe/uc/rs6000_64/brarchive

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /sapmnt/Q01/exe/uc/rs6000_64/brbackup

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /sapmnt/Q01/exe/uc/rs6000_64/brconnect

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /sapmnt/Q01/exe/uc/rs6000_64/brrecover

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /sapmnt/Q01/exe/uc/rs6000_64/brrestore

setsecattr -c accessauths=ALLOW_OWNER,ALLOW_GROUP innateprivs=PV_DAC_UID
secflags=FSF_EPS /sapmnt/Q01/exe/uc/rs6000_64/brspace

setkst
```

End of: AIX |



## 5.13 Backing Up the Database

You need to back up your upgraded Oracle Database 12c database.

### Caution

You risk losing data if you do not back up your database.

### Procedure

Perform a full database backup.

### Example

You can enter a command like the following to perform a full database backup:

```
brbackup -u / -type offline -mode all -device disk -compress yes -language E
```

## 5.14 Updating the SAP Executables

If you are not running a SAP kernel supported for Oracle 12c yet, you need to update the SAP executables to the latest SAP kernel supported for Oracle 12c. This is a task for the <sapsid>adm.

### Procedure

For supported SAP kernels 7.21EXT, see the procedure in SAP Note [1716826](#). For supported SAP 7.41 downward-compatible kernels (DCK), see the procedure in SAP Note [1994690](#).

### Caution

In an MCODE system, you have to update the executables of **all** SAP systems connecting to the database.

Only valid for: ABAP+Java;Java;Java Add-In |

## 5.15 Updating the JDBC Driver References

If you have an SAP system with Java components, you have to change the JDBC driver references after you have upgraded the database client software. Otherwise the J2EE Engine cannot start because the driver references still point to the old Oracle client software home.

### Note

You only need to perform this procedure if the major version of your Oracle client software has changed.

If your SAP software is version 7.0 or below, follow SAP Note [867976](#) to change the JDBC driver references in the J2EE engine. For Oracle 12c, `DB_URL` has not changed

If your SAP software is version 7.1 or higher, change the reference to the JDBC driver in the instance profile as described below.

## Prerequisites

- Secure storage in file system (SSFS) is enabled and configured
- SAP can connect to the database through the SSFS connect mechanism

## Procedure

1. Change to the correct directory containing the file `<SAPSID>_J<instance_number>_<host>`.
2. Open the file with your text editor and search for property `j2ee/dbdriver`.
3. Replace the old driver **location** with the new one:

```
/oracle/client/<Oracle_client_major_version>x/instantclient/
<java_class_archive>.jar
```

where `<Oracle_client_major_version>` is the major version of the Oracle client that you are using after this upgrade. So for example, if you are now using Oracle 12.1, set the new driver location to `/oracle/client/12x/instantclient/<java_class_archive>.jar`. For Oracle client 11g, make sure the new driver location is set to `/oracle/client/11x_64/instantclient/<java_class_archive>.jar`.

### Caution

Do **not** change the file `<java_class_archive>.jar`, which is one of the following:

- `ojdbc14.jar`
- `ojdbc6.jar`

| End of: ABAP+Java;Java;Java Add-In |

## 5.16 Starting the SAP System

You need to restart the SAP system.

## Prerequisites

- The supported SAP kernel for Oracle 12c is installed.
- Secure storage in file system (SSFS) is configured.
- The switch to user `oracle` has been made.
- The latest BR\*Tools 7.40 are installed and configured.
- The recommended Oracle client software is installed.

- The environment has been adapted for the Oracle administration users such as <sid>adm.

## Procedure

1. Log on as <sid>adm.
2. For SAP installations with an ABAP application server, enter this command to check whether R3trans can connect to the database:

```
R3trans -d
```

### **i** Note

Connecting to the database with `R3trans -d` only works successfully if SSFS is already configured. For more information, see SAP Notes [1639578](#) and [1622837](#).

3. Start the SAP system:  

```
startsap
```

You can also use `sapcontrol`.
4. Check the new Oracle version using SAP transaction ST04.

## 5.17 Configuring the New Features for Oracle Database 12c Release 1 (12.1)

You can configure the new Oracle Database 12c Release 1 (12.1) features.

### Procedure

For more information about new features with Oracle Database 12c Release 1 (12.1), see SAP Note [1914631](#). This note provides links to other SAP notes that describe how to configure or activate each new feature.

## 5.18 Deinstalling the Old Oracle Home

Once the database is running correctly, it is recommended to deinstall the old Oracle Home to prevent accidental usage of the old binaries.

To delete the old Oracle Home, see SAP Note [1915314](#) and [docs.oracle.com/database/121/LADBI/remove\\_oracle\\_sw.htm](https://docs.oracle.com/database/121/LADBI/remove_oracle_sw.htm).

### Procedure

Follow the procedure in the above SAP Note to deinstall the old Oracle Home directory.



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