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Introduction to Upgrading to Oracle Database 12c

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Objectives

After completing this lesson, you should be able to:

- Describe upgrade methods
- Describe data migration methods
- Describe the upgrade process

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Defining Upgrade and Data Migration

- *Upgrading:*
 - Transforms an existing Oracle Database environment into an Oracle Database 12c environment
 - Does not affect user data
- *Migrating data:*
 - Moving data from one Oracle database to another database
 - Does not include upgrading to a new release of Oracle Database

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Upgrade refers to transforming an existing Oracle Database environment into a new release of Oracle Database, in the case of this course to Oracle Database 12c.

Data migration refers to moving data from one Oracle Database into a database that was created in advance for the migrated data. Migration does not involve an upgrade of the Oracle Database software.

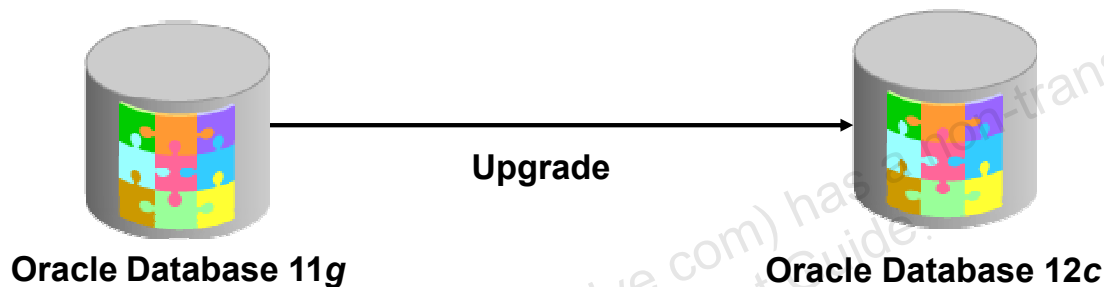
Note: Best practice is to perform migration and upgrade operations separately.

This lesson provides details on how you can upgrade to Oracle Database 12c and how you can migrate data to an Oracle Database 12c database.

Upgrade Methods

The upgrade methods are:

- Database Upgrade Assistant (DBUA): Recommended for major release and patch release upgrades
- Manual method using SQL scripts and utilities



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You can ease the process of upgrading a database to Oracle Database 12c through careful planning and use of the Oracle Database tools. The method you choose to upgrade depends on several factors. Oracle Database supports the following methods for upgrading a database:

- **Using the Database Upgrade Assistant (DBUA):** This tool can be launched by the Oracle Universal Installer (OUI) or as a stand-alone tool at any time in the future to upgrade a database. DBUA provides a graphical user interface (GUI) that guides you through the upgrade of a database.
- **Performing a manual upgrade:** A manual upgrade is a command-line upgrade of a database by using SQL scripts and utilities. Though a manual upgrade gives you finer control over the upgrade process, it is susceptible to errors if any of the upgrade or preupgrade steps are either not followed or are performed out of order.

Note: DBUA is the preferred method of upgrading a database. It is highly recommended that you use DBUA to upgrade to Oracle Database 12c.

Database Upgrade Assistant: Advantages and Disadvantages

- Advantages:
 - Automates all tasks
 - Performs both release and patch set upgrades
 - Supports RAC, single instance, and ASM
 - Informs the user and fixes upgrade prerequisites
 - Automatically reports errors found in spool logs
 - Provides complete HTML report of the upgrade process
 - Command-line interface allows ISVs to automate
- Disadvantages:
 - Offers less control over individual upgrade steps

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The Database Upgrade Assistant (DBUA):

- Guides you through the upgrade process and configures a database for the new release
- Automates the upgrade process and makes appropriate recommendations for the configuration options, such as tablespaces and redo logs
- Shows the upgrade progress for each component, while the upgrade is running
- Writes detailed trace and log files and produces a complete HTML report for later reference
- Automatically locks new user accounts in the upgraded database to enhance security
- Proceeds to create new configuration files (initialization parameter and listener files) in the new Oracle home
- Upgrades all the database and configuration files on all nodes in the cluster, in an Oracle RAC environment
- Supports a silent mode of operation where no user interface is presented to the user

If the DBA requires more control over the individual steps in the upgrade process, a manual upgrade is still possible. Usually, however, the manual upgrade method is more error prone, is harder to automate, and involves a greater amount of work than upgrading with the DBUA.

Manual Upgrade: Advantages and Disadvantages

- Advantages:
 - The DBA controls every step of the upgrade process.
- Disadvantages:
 - It involves more work for the DBA, who must:
 - Perform a manual space check for the `SYSTEM` and `SYSAUX` tablespaces
 - Manually adjust all obsolete or deprecated initialization parameters
 - Perform a user-driven backup of the database
 - It is subject to errors.

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A manual upgrade consists of running SQL scripts and utilities from a command line to upgrade to Oracle Database 12c. Depending on the release of the database being upgraded, you may need to perform additional preupgrade steps. If you must upgrade to an intermediate release, check the release documentation for the release that you are upgrading to.

Though a manual upgrade gives you finer control over the upgrade process, it is susceptible to errors if any of the upgrade or preupgrade steps are either not followed or are performed out of order. In contrast, DBUA performs all the necessary preupgrade and upgrade steps.

Refer to the *Oracle Database Upgrade Guide* for a list of the scripts and the order in which they should be run.

Upgrade Paths

- Direct upgrade to Oracle Database 12c is supported for Oracle Database release 10.2.0.5, 11.1.0.7, or 11.2.0.2 and higher
- Upgrade to an intermediate release is required for Oracle Database release 11.2.0.1 and releases before 10.2.0.5

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If your Oracle Database software is release 10.2.0.5, 11.1.0.7, or 11.2.0.2 or later, you can perform a direct upgrade to Oracle Database 12c.

If your Oracle Database software is earlier than 10.2.0.5 or is release 11.2.0.1, then you must upgrade to an intermediate Oracle Database release before upgrading to Oracle Database 12c. The intermediate release should be one of the releases that can be directly upgraded to Oracle Database 12c.

Upgrade Method Limitations

Both DBUA and the manual method have the following limitations:

- Target and source must be on the same platform.



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Both DBUA and the manual upgrade method have certain limitations:

- The source and target are the same database. The upgrade is an in-place operation. The database stays on the same platform. No change in operating system (OS) or hardware can take place during the upgrade. The OS must be compatible with both versions of the database.

Upgrading to a New Release of Oracle Database

Step	Tasks
1. Prepare to upgrade	Choose an upgrade method Choose an Oracle home Develop a test plan
2. Upgrade a test database	Test the upgrade process using a test database
3. Test the upgraded database	Complete planned tests ensuring there are no issues. Repeat steps 1-3 if necessary.
4. Prepare the production database	Back up the production database
5. Upgrade the production database	Upgrade to the new release of Oracle Database
6. Tune and adjust the upgraded database	Implement new features Test applications

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The table in the slide lists the major steps that you should perform to upgrade to a new release of Oracle Database.

Basic tasks of each step are as follows:

1. Prepare to upgrade: Become familiar with the new features in the release. Develop a test plan and backup strategy.
2. Upgrade a test database: Test the upgrade process by using a test database, not the production database system.
3. Test the upgraded database: Use the test plan developed in step 1 and test the upgraded database. If there are any issues with the upgraded system, address the issues and retest.
4. Prepare the production database: Prepare the production database system for the upgrade. Schedule downtime as necessary and perform a full or incremental backup.
5. Upgrade the production database: Use the procedures you tested in steps 2 and 3 to upgrade the production database. Back up the database after the upgrade.
6. Tune and adjust the upgraded production database: Implement new features. Test the applications to ensure they operate correctly. Tune the database as necessary.

Migration Methods

The migration methods are:

- Oracle Data Pump
- CREATE TABLE AS SELECT SQL statement

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You can use Oracle Data Pump to perform a full or partial export from your database followed by a full or partial import into a new Oracle Database 12c database. The use of Oracle Data Pump is described in the appendix titled “Migrating Data by Using Oracle Data Pump.”

Note: There may be installations to be migrated that do not support Oracle Data Pump, such as versions before Oracle Database 10.1.0. In those cases legacy Export and Import may be used.

The CREATE TABLE AS SELECT SQL statement can be used to copy data from one database into a new Oracle Database 12c database. Refer to the *Oracle Database SQL Language Reference* for additional information about this command.

Using the Export and Import Method

- This method is required for certain situations:
 - Change in platform
 - Upgrade from unsupported versions
- Export and import are useful in certain cases:
 - Changes in character set
 - In combination with upgrade

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You can use the Oracle Data Pump Export and Import utilities to perform a full or partial export from your existing database, followed by a full or partial import into a new Oracle Database 12c database. Export/Import can copy a subset of the data, leaving the database unchanged.

The Export and Import method is required in certain situations.

- If you want to change operating systems or hardware platforms, you cannot use the DBUA.
- In some situations, a significant effort is required to move the database to a version where the DBUA may be used. In these cases, the export and import method may be used.

The Export and Import method is useful in certain cases

- Character set conversion may be required in some upgrade scenarios.
- If there is a partial export of problem data, you can use the DBUA and import. This method can be used to solve character set issues involving a small number of tables.

Summary

In this lesson, you should have learned how to:

- Describe upgrade methods
- Describe data migration methods
- Describe the upgrade process

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Practice 23

- 23-1: Upgrading an Oracle Database 11g Release 2 Database Using a File System to Oracle Database 12c
- 23-2: Upgrading an Oracle Database 11g Release 2 Database on ASM to Oracle Database 12c
- 23-3: Upgrading an Oracle Database 11g Release 2 Database to Oracle Database 12c on a New OS or Platform
- 23-4: Upgrading an Oracle Database 11g Release 2 Database to Oracle Database 12c with Minimal Downtime

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