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Preparing to Upgrade to Oracle Database 12*c*

ORACLE

Objectives

After completing this lesson, you should be able to:

- List upgrade requirements when certain features or options are used in Oracle Database
- Use the pre-upgrade information tool before performing an upgrade
- Prepare the new Oracle home prior to performing an upgrade

Preparing to Upgrade

1. Familiarize yourself with the features of Oracle Database 12*c*.
2. Determine the upgrade path.
3. Choose an upgrade method.
4. Choose an OFA-compliant Oracle home directory.
5. Prepare a backup and recovery strategy.
6. Develop a test plan to test your database, applications, and reports.

In preparation of your upgrade to Oracle Database 12*c*, you should become familiar with the features of Oracle Database 12*c* that you want to use. The *Oracle Database New Features Guide 12c Release 1* provides a comprehensive list of the new features.

Planning the Upgrade

1. Choose an upgrade method.
2. Test the upgrade:
   a. Prepare the test source
   b. Upgrade
   c. Perform postupgrade steps
3. Record problems.
4. Record lessons learned.

Choosing an Upgrade Method

In many cases, the upgrade method chosen depends on a number of factors. The size of the database and the time required to perform the upgrade are two of the most important factors. There are other factors (such as platform, storage, and character sets) that may limit the choice of the upgrade method.

Testing the Upgrade

In most production environments, the cost of down time is unacceptably high. So, testing the upgrade becomes essential. As in any testing situation, the test environment should be as similar to the production environment as possible. You would then perform the upgrade from preupgrade to postupgrade.

Recording Problems

It is not unusual to find problems that were not anticipated in the plan during an upgrade. Ensure that these issues are documented, especially the solutions.

Recording Lessons Learned

In sites where there are multiple databases to be upgraded, a record of the lessons learned through the course of upgrade testing, and the upgrades themselves can be very valuable in reducing the time it takes to perform each upgrade.

Developing a Test Plan

Type of Testing	Description
Upgrade	Plan and test the upgrade path
Minimal	Move all or part of an application to the new database and run the application without enabling any new database features
Functional	Perform a set of tests in which new and existing features and functions of the system are tested after the upgrade
High Availability	Perform tests to ensure that the upgraded database system meets RTO and RPO business requirements
Integration	Perform tests to ensure that component interaction is correct
Performance	Perform tests to compare the performance of various SQL statements in the new database with the performance of those same statements in the current database
Volume/load stress	Perform tests of the entire upgraded Oracle database under high volume and loads

You should develop a planned set of tests to validate all stages of the upgrade process.

Your test plan should include the following types of testing:

- **Upgrade testing:** Planning and testing the upgrade path
- **Minimal testing:** Moving all or part of an application from the current database to the new database and running the application without enabling any new database features. This type of testing helps to identify any application startup or invocation problems.
- **Functional testing:** Performing a set of tests in which new and existing features and functions of the system are tested after the upgrade
- **High availability testing:** Performing tests to ensure that the upgraded database system meets Recovery Time Objective (RTO) and Recovery Point Objective (RPO) business requirements
- **Integration testing:** Performing tests to ensure that interactions among components of the system is correct
- **Performance testing:** Performing tests to compare the performance of various SQL statements in the new database with the performance of those same statements in the current database
- **Volume and load stress testing for Oracle Database upgrades:** Performing tests of the entire upgraded Oracle database under high volume and loads

Performance Testing

You can use the following Oracle Database features to conduct performance tests:

- Database Replay: Perform real-world testing of a database upgrade using a production workload before actually upgrading the production database
- SQL Performance Analyzer: Forecast the impact of system changes on a SQL workload

Performance tests are used to compare the performance of SQL statements in the upgraded database with the performance of the same statements in the current database. Prior to upgrading your database, you should ensure that you understand the performance profile of the application in the current database.

The following Oracle Database features can be used to conduct performance tests:

- **Database Replay:** You can use Database Reply to perform real-world testing of your production database workload before you upgrade the database. Database Replay captures the database workload on the current production system and enables you to replay it on a test system.
- **SQL Performance Analyzer:** Use SQL Performance Analyzer to forecast the impact of system changes on a SQL workload. SQL statements that will be impacted by the upgrade are identified enabling you to evaluate the impact of the upgrade.

Requirements for Databases Using Oracle Label Security or Oracle Database Vault

Execute the `olspreupgrade.sql` script to move the `AUD$` table from the `SYSTEM` schema to the `SYS` schema.

If you are upgrading from a release prior to Oracle Database Release 12.1 that uses Oracle Label Security (OLS) and Database Vault, you must first execute the OLS preprocess script, `olspreupgrade.sql`, to process the `AUD$` table. The OLS preprocess script moves the `AUD$` table from the `SYSTEM` schema to the `SYS` schema.

To use the OLS preprocess script, copy `ORACLE_HOME/rdbms/admin/olspreupgrade.sql` from the newly installed Oracle home to the Oracle home of the database to be upgraded.

It is recommended that you archive your audit trail before executing the `olspreupgrade.sql` script. Refer to the *Oracle Database Security Guide* for detailed information about archiving the audit trail.

Requirement for Databases Using Oracle Warehouse Builder

- Oracle Warehouse Builder (OWB) is not installed as part of the software for Oracle Database 12*c*.
- OWB components that may exist in earlier releases are not upgraded as part of the Oracle Database upgrade process.
- You can use OWB release 11.2.0.3 with Oracle Database 12*c* as follows:
  - Add Oracle Database 12*c* access to an existing standalone OWB 11.2.0.3 installation.
  - Keep an existing OWB 11.2.0.3 Installation in-place with Oracle Database Release 11.2.0.3.
  - Use the standalone OWB 11.2.0.3 installation where available.

Oracle Warehouse Builder (OWB) is not installed as part of Oracle Database 12*c*, and OWB components that may exist in earlier releases are not upgraded as part of the Oracle Database upgrade process. However, you can use OWB release 11.2.0.3 with Oracle Database 12*c*. You cannot use OWB releases earlier than release 11.2.0.3 with Oracle Database 12*c*.

You can use OWB release 11.2.0.3 with Oracle Database 12*c* as follows:

- Add Oracle Database 12*c* access to an existing standalone OWB 11.2.0.3 installation: Oracle provides a patch update that enables OWB 11.2.0.3 to be used with Oracle Database 12*c*.
- Keep the existing OWB 11.2.0.3 installation in-place with Oracle Database Release 11.2.0.3: If OWB release 11.2.0.3 is running on a platform where a standalone installation is not available, you will need to keep the Oracle Database release 11.2.0.3 software in-place after the migration to Oracle Database 12*c* so that you can run OWB from this Oracle home.
- Use the standalone OWB 11.2.0.3 installation: If OWB 11.2.0.3 is running on a platform where a standalone installation is available (on Linux and Windows), you can install the standalone software and then remove the Oracle Database release 11.2.0.3 software.

Using the Pre-Upgrade Information Tool

After installing the Oracle Database 12*c* software you can optionally use the Pre-Upgrade Information Tool to perform configuration checks:

- Execute the `preupgrd.sql` script
- Review the information displayed by the Pre-Upgrade Information Tool
  - `preupgrade.log` contains the output of the Pre-Upgrade Information Tool
- Resolve issues
  - `preupgrade_fixups.sql` script addresses issues that can be fixed using SQL*Plus in the source database
  - `postupgrade_fixups.sql` script addresses issues that can be fixed after the database has been upgraded

After you have installed the software for Oracle Database 12*c*, you can analyze your database before upgrading it to the new release by using the Pre-Upgrade Information Tool. Execute the `preupgrd.sql` script from the environment of the database you are planning to upgrade.

The Pre-Upgrade Information Tool generates "fix-up" scripts that you can execute to resolve issues that are flagged in the source database:

- The `preupgrade_fixups.sql` script can be used to fix issues in the source database.
- The `postupgrade_fixups.sql` script can be used to fix issues after the database has been upgraded.

A log file named `preupgrade.log` is created containing the output of the Pre-Upgrade Information Tool and information about issues that require manual intervention.

Although it is not mandatory to use the Pre-Upgrade Information Tool prior to performing the upgrade, using it gives you an opportunity to address issues in advance. Before upgrading to the new release of Oracle Database, it is recommended that you analyze the information and warnings displayed by the Pre-Upgrade Information Tool.

Backing Up the Database

Perform an online backup by using RMAN

```
RUN
{
ALLOCATE CHANNEL chan_name TYPE DISK;
BACKUP DATABASE FORMAT 'some_backup_directory%U' TAG
   before_upgrade;
BACKUP CURRENT CONTROLFILE FORMAT 'controlfile location
   and name';
}
```


After running the Pre-Upgrade Information Tool, it is recommended that you back up the database. To minimize downtime, you may perform an online backup.

Summary

In this lesson, you should have learned how to:

- List upgrade requirements when certain features or options are used in Oracle Database
- Use the pre-upgrade information tool before performing an upgrade
- Prepare the new Oracle Home prior to performing an upgrade

Practice 24

- 24-1: Executing Preliminary Steps and the Pre-Upgrade Script
- 24-2: Implementing the Pre-Upgrade Information Tool Recommendations
- 24-3: Completing Prerequisites Steps Before the Upgrade
- 24-4: Performing a Full Database Backup