

Migrating an Oracle9i RAC Database to Oracle 10g

A vastly enhanced feature set and proven scalability across multiple nodes coupled with automated management capabilities have motivated many enterprises to upgrade their systems to Oracle® Database 10g Real Application Clusters. This article focuses on a tool available in Oracle Database 10g that helps simplify the upgrade process significantly—the Database Upgrade Assistant utility.

BY SANJEET SINGH, ANTHONY FERNANDEZ, AND UDAY SHET

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An outstanding feature set with enhanced support for clustered applications and automated management capabilities enable Oracle Database 10g to provide a highly available and scalable platform for enterprise database applications. The Dell™ PowerEdge™ line of dual- and quad-processor servers combined with the Real Application Clusters (RAC) architecture of Oracle Database 10g can provide a desirable price/performance advantage to enterprise customers. This combination enables a highly scalable architecture that allows an IT infrastructure to grow in cost-effective increments.

Oracle RAC 10g introduces features such as Automatic Workload Repository, Automatic Storage Management, Automatic Database Diagnostic Monitor, and Oracle Data Pump, plus enhancements to Oracle Enterprise Manager, tablespace control, and self-tuning capabilities. Added to a standardized and modular set of hardware components, this set of enhanced management and self-tuning features can significantly reduce total cost of ownership. Dell provides a validated and tested stack of Oracle RAC 10g database solutions. This can reduce the time required for integration and deployment significantly in addition to providing a proven solution.

These factors prompt many enterprises to migrate their database systems to Oracle RAC 10g. The upgrade can be performed manually by running the SQL-based upgrade scripts provided by Oracle 10g. Alternatively, administrators can use the Database Upgrade Assistant (DBUA) utility, which is the Dell-recommended method. The DBUA is an automated wizard introduced in Oracle Database 10g that supports upgrades from Oracle8i (8.1.7), Oracle9i (9.0.1), and Oracle9i Release 2. Administrators upgrading from earlier versions such as Oracle 8.1.6 must first upgrade to Oracle 8.1.7 before they can use the Oracle Database 10g DBUA to upgrade their version of the database.

Cluster upgrade considerations

The database upgrade procedure involves installing the new version of the database—Oracle Database 10g binaries—and upgrading the existing database. Dell recommends that administrators do a test run of the upgrade on a test database to verify that the application data and custom objects can upgrade successfully before upgrading the production system.

To help ensure minimal or zero downtime, Dell recommends that administrators have a logical standby

database. Oracle Database 10g RAC has support for basic rolling upgrades—the RAC instances on different nodes can be upgraded in a sequential manner and hence require minimal downtime. However, rolling upgrades are not supported for database versions prior to Oracle Database 10g.

The Oracle Database 10g upgrade installation can be performed on various configurations that have been tested and validated by Dell and Oracle.¹ However, additional factors must be considered when upgrading a preexisting Oracle9i cluster to Oracle Database 10g RAC:

- Oracle Database 10g should be installed from an ORACLE_HOME directory that is different from the preexisting Oracle9i database ORACLE_HOME. For example, if the Oracle9i ORACLE_HOME is /opt/oracle/product/9.2.0, then Oracle Database 10g should be installed under /opt/oracle/product/10.1.0.
- The Oracle9i Global Services Daemon (GSD) must be stopped before Cluster Ready Services (CRS) is installed. However, the Oracle9i Cluster Manager (oracm) should be running.
- If the Oracle9i server management database file (srvm.dbf) is located on an Oracle Cluster File System (OCFS) partition residing on shared storage, the server management configuration file (/var/opt/oracle/srvConfig.loc) should be moved to a temporary location for the duration of the CRS installation; this step helps ensure successful execution of the CRS Oracle Universal Installer (OUI). Administrators should return /var/opt/oracle/srvConfig.loc to the proper OCFS partition after the CRS installation has completed.
- During the CRS installation process, the OUI prompts the administrator to log in as the root user and run the scripts located in ORA_CRS_HOME/root.sh. To upgrade the environment variable for the CRS, the Oracle Cluster Registry must point to the Shared Oracle9i server management database file (srvm.dbf). The administrator must edit ORA_CRS_HOME/root.sh on all nodes and update the CRS_OCR_LOCATION to indicate the location of the srvm.dbf file. The administrator must also edit the /etc/oracle/ocr.log file with the updated path to the srvm.dbf file.

After CRS is started on a cluster, Oracle Database 10g software can be installed according to OS-specific directions that can be found at www.dell.com/10g. However, administrators should be aware of the following considerations:

- When Oracle Database 10g software is being installed, CRS and the Oracle9i oracm stack must be running. However, the Oracle9i GSD should not be running.

- The OUI for Oracle Database 10g detects any existing database and displays a page from which the administrator can select the older database to be upgraded.

Procedural upgrade enhancements

All too often, the Oracle database upgrade process has been cumbersome and error-prone. With releases before Oracle Database 10g, the administrator performing the upgrade was required to manually enter the initialization parameters and system resources. For example, the administrator had to ensure that adequate space was provided in the system tablespace and that rollback segments were properly sized.

When upgrading to Oracle Database 10g, administrators can opt to run the upgrade scripts manually or use the DBUA wizard. The DBUA is an interactive graphical tool that guides the administrator through the upgrade process, calling upon other tools in the background to perform individual tasks as required.

Pre-Upgrade Information Tool

The Pre-Upgrade Information Tool (utlu101i.sql) is invoked by the DBUA. It analyzes the database to verify that system requirements for upgrading to Oracle Database 10g have been met before the upgrade begins. For example, the Pre-Upgrade Information Tool checks the following parameters and system resources:

- The current version of the database is 8.0.6; 8.1.7; 9.0.1; or 9.2.
- The parameter `compatible` is 9.2.0 or greater.
- Tablespaces meet the minimum recommended sizes.
- Redo logs are at least 4 MB.
- The parameter `pga_aggregate_target` is at least 24 MB.
- The parameters `shared_pool_size`, `large_pool_size`, and `java_pool_size` are set to at least 96 MB, 8 MB, and 48 MB, respectively.
- The size of the sysaux table is adequate for Oracle Database 10g.

In addition, the Pre-Upgrade Information Tool checks for updated, deprecated, and obsolete initialization parameters, and estimates the time to perform the upgrade.

By default, the DBUA turns off archiving to improve performance. However, if the database being upgraded is part of an Oracle Data Guard data protection or disaster recovery environment, turning off archiving may cause problems. To avoid related complications, the administrator can enable the archiving mode during the upgrade process by setting the parameter `DisableArchiveLogMode` to “false” in the Oracle Database 10g `_oracle_home/rdbms/admin/utlu101x.sql` file.

¹ For detailed information about Oracle Database 10g support and product offerings—including specific configurations that have been tested and validated by Dell and Oracle—visit www.dell.com/10g.

Storage of auxiliary database metadata

The sysaux tablespace is a required tablespace in Oracle Database 10g that provides storage of non-“sys”-related tables and indexes that resided in the system tablespace of earlier versions of Oracle databases. This system-owned tablespace provides a centralized location for all auxiliary database metadata that does not reside in the system tablespace. For example, the objects related to the Oracle Recovery Manager (RMAN) catalog, online analytical processing (OLAP), and Oracle Text now reside in sysaux instead of the system tablespace. The sysaux tablespace also reduces the number of tablespaces created by default, and it has the same security profile as the system tablespace.

Before the upgrade begins, the DBUA asks for the location of the sysaux tablespace and recommends a size for it. The administrator has the option of changing its size before the tablespace is created. Then the DBUA creates a sysaux tablespace of the determined size.

Database backup option

The Oracle Database 10g DBUA also prompts administrators to create a backup of the database before the upgrade begins. This backup option enables administrators to revert to a previous version if a problem occurs during the upgrade. Best practices advise database administrators to back up production databases and perform a test upgrade on a clone of the existing database. This trial run can help ensure that the upgraded production platform meets enterprise requirements.


Post-Upgrade Status Tool

After completing the necessary pre-upgrade steps described in the preceding sections, the DBUA proceeds to upgrade the database.² In earlier versions of the Oracle database, it could be difficult for administrators to determine whether an upgrade was successful. With Oracle Database 10g, after an upgrade is complete, the DBUA invokes the Post-Upgrade Status Tool. This tool is designed to check the status of the upgrade and display a confirmation message if all components in the database have successfully completed the upgrade. If it finds a problem, the DBUA lists components that are invalid or do not reflect the correct version.

The Post-Upgrade Status Tool works by querying dba_server_registry and listing the status and version of each component. If a component has not been upgraded, it provides a brief description of the corrective action that the administrator needs to take to manually upgrade the component. The DBUA provides the option to recompile invalid objects immediately after the upgrade or at runtime on a when-needed basis. When-needed recompiling can shorten upgrade time, but it may also degrade database performance when recompiles are performed at runtime. If an upgrade is not satisfactory, the DBUA allows the administrator to restore

the saved database. At that point, all changes performed during the upgrade are reversed.

Streamlined migration to Oracle Database 10g clusters

Oracle Database 10g can help enterprises improve the availability and performance of clustered database applications by providing a significantly enhanced feature set and automated management capabilities. In addition, the DBUA utility helps simplify the process of upgrading from Oracle9i to Oracle Database 10g clusters, enhancing the efficiency and productivity of database administrators. As a result, enterprises running earlier versions of the Oracle database need not shy away from the benefits of migrating to this feature-rich, highly scalable database. 

References

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Sanjeet Singh is a software engineer in the Dell Database and Application Engineering Group. Sanjeet has a B.S. in Electrical Engineering and an M.S. in Computer Engineering from Purdue University.

Anthony Fernandez is a senior analyst with the Dell Database and Applications Team of Enterprise Solutions Engineering in the Dell Product Group, where he focuses on database optimization and performance. He has a B.S. in Computer Science from Florida International University.

Uday Shet is a senior engineering analyst in the Dell Database Solutions Group. Uday has a B.E. in Computer Science and is also an Oracle Certified Professional (OCP).

FOR MORE INFORMATION

Oracle Database 10g:

www.oracle.com/database

Oracle database backup and recovery:

www1.us.dell.com/content/topics/global.aspx/power/en/ps1q03_singh?c=us&cs=555&l=en&s=biz

² For more information, including a detailed, step-by-step Oracle database upgrade procedure, visit www.dell.com/oracle, locate the “Learning Center” section, and click on “Migration and Upgrade Documents.”