

Oracle Database 10g Release 2: A Revolution in Database Technology

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Oracle Database 10g Release 2: A Revolution in Database Technology

Oracle Database 10g is Oracle's largest, most innovative release ever, and it is having the largest impact on computing, fundamentally changing the way data centers look and operate.

INTRODUCTION

Oracle Database 10g is revolutionary. It is Oracle's largest introduction of new functionality ever, beginning with Release 1 of Oracle Database 10g in January 2004 and now Release 2 in 2005. It is Oracle's most innovative release, leading the database industry into entirely new ground in clustering, automation, high availability, and more. And, it is having the largest impact on computing of any database software release. Oracle Database 10g fundamentally changes the way data centers look and operate.

Oracle Database 10g transforms data centers from collections of separate, monolithic systems configured to handle individual applications to a smaller number of consolidated, shared pools of server and storage resources called infrastructure grids. Oracle's unique scale-out architecture enables applications of all types to dynamically provision additional servers and storage resources as needed to meet their changing processing demands. It delivers dramatic cost savings and equally dramatic advancements in quality of service.

Oracle Database 10g delivers dramatic cost savings and equally dramatic advancements in quality of service.

Cost savings come from multiple sources. Oracle reduces hardware costs significantly by enabling even the largest systems to be built out of small, low-cost servers and modular storage arrays. New automation capabilities in Oracle Database 10g dramatically decrease the cost of database administration. Also, Oracle full stack solutions eliminate the need for costly 3rd party management tools and utilities.

The advancements in quality of service are across the board. Particularly significant is the automation of database administration functions that raise usability to a revolutionary new level. Not only are DBAs vastly more productive, they are empowered to deliver new levels of consistently optimized performance, high availability, and more. Oracle Database 10g further increases Oracle's lead in virtually every area of database capability. This includes high availability, performance, business intelligence, data movement, security, application development, and more.

DRAMATIC COST SAVINGS

Oracle Database 10g reduces server costs, storage costs, administration costs, and 3rd party product costs.

Oracle reduces server costs significantly by enabling even the largest systems to be built out of small, low-cost servers.

Reduced Server Costs

Dramatic savings on servers are made possible by Oracle Real Application Clusters (RAC). First introduced in Oracle9i, RAC has been substantially improved in Oracle Database 10g to make it easier to manage and more accessible to mainstream users. RAC's scale-out capability enables you to build infrastructure grids using clusters of low cost servers, e.g., 2 or 4 CPU servers, that are much less expensive than large, monolithic symmetric multiprocessor (SMP) systems.

RAC also saves you money in other ways. It minimizes your initial server investment. You buy just the processing power you need today. Additional servers can always be added later as your processing demands grow. Building an infrastructure grid out of small servers also lets you take advantage of the latest and greatest CPU technology. New CPU technology takes many months of costly engineering effort to become available in large SMP systems.

Finally, RAC saves you money because it is a very economical, as well as a very powerful, high availability solution. In a RAC environment all the servers in the infrastructure grid can be actively processing data for your application. If any server fails your application simply continues processing on the remaining servers. A traditional cold fail-over configuration, in contrast, is expensive because it requires an extra backup server that just sits there idle during normal operations.

Reduced Storage Costs

Oracle Database 10g enables you to build low cost storage pools for your infrastructure grid using simple, modular, storage arrays and inexpensive ATA disks.

Typically, the costliest component after the servers is the storage. With Oracle Database 10g, infrastructure grids use shared pools of low cost storage such as simple, modular storage arrays and inexpensive ATA disks. When combined with new, innovative features in Oracle Database 10g such as Automatic Storage Management and Flashback technology, the total system becomes more highly available, better performing, more scalable, more flexible, and easier to manage than systems built using expensive, monolithic, storage arrays.¹

Oracle Database 10g provides comprehensive protections against disk failures, storage array failures, low-level I/O corruptions, disasters, and human errors. Data is automatically balanced across the available storage while the system is online to optimize database performance. There is no limit to the size of the storage system. Storage for your infrastructure grid can be scaled to any size by simply adding additional modular storage arrays. You can even flexibly combine storage arrays from multiple vendors. All of this capability is designed and pre-integrated to maximize the management of Oracle Database environments.

¹ For more information see the Oracle Resilient Low-Cost Storage Initiative at: <http://www.oracle.com/technology/deploy/availability/htdocs/lowcoststorage.html>

New automation capabilities dramatically decrease the cost of database administration. Existing DBA staffs can now accomplish much more.

Reduced Administration Costs

Oracle Database 10g makes DBAs far more productive. Numerous, major areas of database administration have been either entirely automated or dramatically simplified. This is part of a larger effort that actually began with the Oracle9i release of the Oracle database. The accomplished goal of Oracle9i was to reduce the effort needed to administer an Oracle database by one half. The accomplished goal of Oracle Database 10g was to reduce the effort by another half. More has been invested in reducing administration costs in these two major database releases than in any other area of functionality. Existing DBA staffs can now accomplish much more and deliver even higher quality service to their end users.

Reduced 3rd Party Product Costs

Oracle Database 10g also reduces or even eliminates the need for expensive 3rd party management and utility software of all types. Automatic Storage Management eliminates the need for 3rd party volume managers and file systems for managing Oracle data. For Real Application Cluster environments, Oracle's own integrated clusterware eliminates the need for 3rd party clusterware products. Oracle Enterprise Manager Grid Control and Management Packs eliminate the need for 3rd party administration and tuning tools. And, Oracle Database 10g's comprehensive set of data warehousing and business intelligence tools eliminate the need for 3rd party tools for ETL, OLAP, Data Mining, and other functions.

Oracle full stack solutions eliminate the need for costly 3rd party management tools and utilities.

New in Release 2

In Oracle Database 10g Release 2, the new Oracle Secure Backup tape archiving facility eliminates the need for 3rd party tape backup products, new improvements in sort performance eliminate the need for 3rd party sorting software, and improved cluster file resiliency (for OCS and the Voting Disk) eliminate the need for 3rd party disk mirroring products.

DRAMATIC ADVANCEMENTS IN QUALITY OF SERVICE

Oracle Database 10g not only saves you money, it enables DBAs to deliver much higher quality of service for their end users. Because many key database administrative functions have been automated or significantly simplified, DBAs can do a better quality job. DBAs can more effectively deliver consistently optimized performance with much less effort even in complex environments with mixed and constantly changing workloads. DBAs are better able to keep systems up and available using Oracle Database 10g's comprehensive protections against potential system outages, including new, innovative protections against human errors, probably the biggest remaining threat to system availability.

Oracle Database 10g provides dramatic advancements in quality of service. Not only are DBAs vastly more productive, they are empowered to deliver new levels of consistently optimized performance, high availability, and more.

With Oracle Database 10g, DBAs and application developers can more easily extract useful and actionable information out of your data using the complete data warehousing and business intelligence tool set now fully incorporated into the

Oracle Database and more effectively store and process all your data including text, spatial, and XML data. Finally, Oracle Database 10g provides major new capabilities in virtually all supporting areas of functionality including data movement, performance, security, and application development.

Improved Manageability

Oracle Database 10g takes usability to a whole new level by building advanced, automated management capability deep within the internals of the Oracle Database and through powerful GUI-based tools and utilities.

Oracle Database 10g takes usability to a whole new level. Whereas other databases with a reputation for being easy to use get that reputation because the limited range of functionality they provide keeps their management simplistic, Oracle offers the industry's most extensive range of functionality and now the ability to manage this full range easily and effectively. It does this by building advanced, automated management capability deep within the internals of the Oracle Database for maximum power and performance, and through powerful GUI-based tools and utilities.

Self-Managing Database

The following are the new, self-management capabilities built into Oracle Database 10g:

Automatic Storage Management (ASM) optimizes Oracle's I/O performance by automatically balancing the distribution of data across available storage to eliminate I/O bottlenecks. A unique strength of ASM is its ability to automatically rebalance the data while the system is online when new disks are added or removed, freeing your DBA staff for other activities. ASM also provides optional mirroring capabilities that can be used to mirror across storage arrays to protect against storage array failures.

Automatic Memory Management optimizes Oracle's use of memory for caching data, sorting data, storing execution plans, caching data dictionary information and many other functions by automatically allocating memory resources to these functions for optimal total performance. A unique strength of this facility is its ability to automatically and dynamically adjust the memory allocated to each function as workloads change by constantly monitoring the efficiency of memory usage. This work was begun in Oracle9i where approximately half the memory areas (the private global areas) were automatically managed and completed in Oracle Database 10g where the remaining memory areas (the shared global areas) are automatically managed.

With Oracle Database 10g self-managing database capabilities, DBAs can more effectively deliver consistently optimized performance with much less effort even in complex environments with mixed and constantly changing workloads.

Automatic Optimizer Statistics Collection keeps Oracle's execution plans optimized by automatically updating data distribution statistics for the Oracle optimizer. A unique strength is its ability to efficiently and automatically determine which tables are in most need of new statistics, i.e., have changed most since statistics were last collected, and the sample size needed to efficiently gather the most effective results.

Automatic Workload Repository enables Oracle to automate the tuning process by automatically gathering a wealth of performance statistics and storing them in the Oracle Database for analysis. By default, it gathers new statistics every 60 minutes and stores them away for seven days. A unique strength is its ability to gather and store this data with very minimal impact on database performance. Most Oracle Database 10g customers will not detect any impact.

Automatic Database Diagnostics Monitor automates the performance diagnostics and tuning process by analyzing the performance statistics captured in the Automatic Workload Repository. It identifies potential performance problems and provides specific remedies for each identified problem. It can be viewed as a MD General Practitioner who examines the results of a complete battery of physical tests every 60 minutes and either makes the diagnoses directly or calls in specialists as is appropriate. A unique strength is that it incorporates the experience and knowledge of Oracle's most senior performance experts and developers into the data analysis and recommended actions.

Automatic SQL Tuning is the specialist for SQL tuning. It comprehensively tunes a SQL statement by looking at all possible tuning strategies such as indexing, SQL restructuring, statistics refresh, and plan tuning. A unique strength is its innovative SQL Profiling technology that can tune SQL statements without requiring any direct change to the application code. This not only obviates the need for manual tuning of SQL statements by using query hints but also makes it possible to tune packaged applications where users are not able to modify the application code.

Segment Advisor identifies fragmented storage segments whose allocated space contains a significant amount of "free" space. The DBA may then choose to perform a segment shrink - an in-place, online reorganization of a database table - to compact the data and free up the unused storage space for other uses.

With automatic workload management individual application workloads, called Services, to be tracked and managed.

Automatic Workload Management enables individual application workloads, called Services, to be tracked and managed. The Automatic Workload Repository tracks performance for each workload to enable service levels agreements to be individually monitored. In Real Application Cluster environments, DBAs can define which nodes in the cluster workloads will run on during both normal operations and when node failures occur. High priority workloads can be automatically moved to surviving nodes when node failures occur.

Automatic Disk-Based Backup and Recovery automates and dramatically improves the efficiency of the database backup and recovery process by employing a disk-based Flashback Recovery area for storing all backup components. It lets you trade inexpensive disk storage for expensive downtime. Backup and recovery operations that used to take hours with tape are reduced to just minutes. Oracle Database 10g's new incremental backup capability is more than 10 times faster than in Oracle9i.

Grid Control gives administrators the power and flexibility to manage their global distributed enterprise from anywhere, at any time. Advanced capabilities are provided through management packs.

Enterprise Manager Grid Control

Enterprise Manager Grid Control is an entirely web-based GUI tool designed to manage the entire infrastructure grid, i.e., storage, databases, and application servers. It gives administrators the power and flexibility to manage their global distributed enterprise from anywhere, at any time. Advanced capabilities are provided through optional management packs including the Oracle Diagnostic Pack, Tuning Pack, Configuration Management Pack, and Change Management Pack. It greatly simplifies cluster environments by enabling Oracle Real Application Cluster configurations to be managed as a true, single system image.

Full Stack Cluster Solutions

Oracle's full stack of cluster components come pre-configured to work together, are installed using standard Oracle installation tools, and are supported through one call to Oracle Support.

In the earlier Oracle9i release, the biggest single barrier to the adoption of Oracle Real Application Clusters was the initial setup of the cluster environment. This was challenging because software components such as cluster file systems, volume managers, and clusterware often had to be obtained from 3rd party companies and configured to work together. Oracle Database 10g customers now have the option of getting this full stack of cluster functionality directly from Oracle at no additional charge. All of these cluster components come pre-configured to work together, are installed using standard Oracle installation tools, and are supported through one call to Oracle Support.

Installation, upgrade, and configuration all underwent major redesign in Oracle Database 10g.

Improved Installation, Upgrade, and Configuration

Installation, upgrade, and configuration all underwent major redesign in Oracle Database 10g. The new, light-weight install takes just 20 minutes and requires only a single CD for a basic Oracle Database installation. Pre and post system checks improve the reliability of both installation and upgrade. Silent installation and upgrade have been improved for ISVs. Upgrade now has a time estimator and is re-startable. 90% of the configuration parameters have been eliminated – there are now less than 30 basic parameters. Common tasks such as backups and optimizer statistic collection are automatically setup during install.

New in Release 2

In Release 2, the Automatic Diagnostic Monitor is now even more comprehensive, Enterprise Manager Grid Control has many new features, Automatic Storage Manager can be shared by multiple databases, and the Cluster Verification Utility makes installation, upgrades, and configuration more reliable.

In Oracle Database 10g Release 2, the performance analysis performed by the Automatic Database Diagnostic Monitor is now even more comprehensive. It is able to more precisely optimize use of a broader range of hardware resources including CPU, paging, and integrated memory cache. More server components are supported including Streams replication, Advanced Queuing, and Recovery Manager. Immediate “spot” analysis of current performance is supported through the new Active Sessions History (ASH) Report, and the new Compare Periods Report helps identify performance differences between two user-specified periods of time including before and after upgrades.

Enterprise Manager Grid Control has many new features. The ability to manage application workloads as Services is greatly enhanced. A topology viewer makes it easier to view the status of infrastructure components and understand how they relate to one another and the Service. Improved baseline performance measurements make it easier to detect whether performance service level agreements are being met. Graphical displays and reporting have been improved including the ability to view performance in real time, recent real time, and historically. Direct access to performance data in the database system, bypassing the SQL layer, enables analysis of slow or hung systems. Finally, support has been added for Streams, Advanced Queuing, XML DB, and Spatial functionality.

Automatic Storage Management now enables a single storage pool to be shared by multiple databases for optimal load balancing even among different versions of the Oracle Database. Storage resources can alternatively be assigned to individual databases and easily moved from one database to another as processing requirements change. Manageability has also been improved. For example, DBAs now have more control over operations that act on multiple disks at one time.

The new Automatic Segment Advisor proactively identifies segments that have internal fragmentation and recommends appropriate actions. The recommendation could be an advisory to shrink the segment if it is a candidate for segment shrink or for online redefinition if segment shrink is not permitted.

Lastly, a new Cluster Verification Utility makes the installation and upgrade of Real Application Cluster configurations simpler and more reliable by providing more in-

depth pre and post validations of the cluster environment for each installation and upgrade step.

High Availability

With Oracle Database 10g, Oracle took the lead in another key area of high availability, the most significant remaining threat to system uptime – human error.

Oracle's proven record for robust high availability is well known. Led by Oracle Real Application Clusters, which provides industry leading protection against server failures, Oracle provides the most comprehensive protections against unplanned outages cause by threats such as disk failures, storage array failures, low level I/O subsystem block corruptions, and even disasters that destroy entire data centers. Oracle also provides the industry's most comprehensive support for online system and data changes. CPUs, cluster nodes, memory, and disks can all be added or removed while your database remains up and accessible. Table storage can be reorganized, column types and sizes redefined, and all indexing operations performed while the system is online.

With Oracle Database 10g, Oracle took the lead in another key area of high availability, the most significant remaining threat to system uptime – human error. Oracle Database 10g also introduced many other key high availability features including online rolling upgrades, extremely fast incremental backup, new GUI management tools and real time apply for disaster recovery, and more.

Protection from Human Errors

Protection from human errors takes two forms, 1) prevention through automation and simplification, and 2) faster and more reliable ways to recover when they do happen. As well as lowering costs and enabling DBAs to deliver higher quality of service, the many new manageability features described above significantly lower the potential for DBA errors.

The new flashback technologies introduced in Oracle Database 10g make recovery from human errors fast and reliable. New and improved features such as flashback query, flashback versions, and flashback transactions enable DBAs and other users to look back in time to see what the data looked like before the error took place, e.g., before a bug in an application program corrupted the data. With these features you can pinpoint exactly when the error happened and what the extent of the damage is. Then your can use new features such as flashback table and flashback database to restore your data to the earlier correct values. These features are like the rewind button on a cassette tape recorder. They allow you to quickly flashback a table or your whole database in place to the earlier correct point in time that you have identified.

Oracle Database 10g also introduced many other key high availability features including online rolling upgrades, extremely fast incremental backup, new GUI management tools and real time apply for disaster recovery, and more.

With Release 2, disaster recovery configurations can failover automatically, the cost and complexity of 3rd party tape archiving products can be eliminated, your database can be flashbacked to a predefined earlier point in time, and Oracle clusterware can coordinate the recovery of 3rd party and customer applications.

Other New High Availability Capabilities

DataGuard, Oracle's disaster recovery solution, underwent many enhancements in Oracle Database 10g. Chief among these are greatly improved manageability, including new easy to use GUI administration capabilities in Enterprise Manager Grid Control, and the real time apply feature. Real time apply enables standby databases to be kept closely synchronized with the primary database for faster failover times and real time reporting.

Oracle Database 10g can now be upgraded while the database is online. Most patches can be applied online to Oracle Real Application Cluster environments and new release upgrades can be done online using DataGuard SQL Apply.

Oracle's new, integrated clusterware capabilities can now coordinate recovery with the Oracle Application Server using a feature called Fast Connection Failover. When node failures occur within a cluster, the Oracle Application Server is signaled so it can immediately institute recovery operations instead of waiting potentially many minutes for connection timeouts to occur.

In Oracle Database 10g, online object redefinition capabilities have been made more automatic and foolproof. For example, if you want to convert a regular table into a partitioned table the Oracle Database now automatically takes care of copying dependent structures such as grants, indexes, constraints, triggers, etc. to the new redefined object.

Lastly, as described above, Oracle Database 10g automates and dramatically improves the efficiency of the database backup and recovery process by employing a disk-based Flash Recovery area for storing all backup components. Oracle Database 10g's new incremental backup capability is more than 10 times faster than in Oracle9i. Blocks are also validated to prevent corruptions to the backup copy.

New in Release 2

New high availability features in Release 2 include:

Automatic fast-start failover for DataGuard disaster recovery configurations enabling failover to occur in seconds without manual intervention.

Automatic Secure Backup tape archiving to securely encrypt backup tapes and eliminate the cost and complexity of working with 3rd party tape archiving products.

Restore points can now be defined to enable quick and easy flashback of your database to a predefined earlier point in time.

Oracle Clusterware High Availability API to enable Oracle integrated clusterware to manage and coordinate the recovery of ISV and customer applications, e.g., automatically relocate and restart an application on another node when the node that it was running on fails.

Oracle Database 10g marks the culmination of an effort begun over a decade ago to incorporate a complete suite of advanced data warehousing and business intelligence capabilities directly into the Oracle Database.

Oracle's unique Real Applications Clustering architecture enables unlimited scalability and the ability to partition the workload across multiple nodes with all users accessing the same database and viewing a consistent "single version of the truth".

Business Intelligence and Data Warehousing

Oracle's business intelligence and data warehouse capabilities provide simplified solutions that vastly improve the quality of analytics delivered to business users while vastly reducing the costs of building and managing the underlying system. Oracle Database 10g marks the culmination of an effort begun over a decade ago to incorporate a complete suite of advanced data warehousing and business intelligence capabilities directly into the Oracle Database. Instead of buying separate tools for data mining, OLAP analysis, statistical analysis and more, Oracle Database customers now have all these capabilities at their fingertips. Instead of moving your data from your data warehouse to, for example, an OLAP engine, advanced OLAP analysis can be done directly inside the data warehouse. You can do virtually any form of advanced data analysis immediately with minimal effort. You use the most current, up to date data in your enterprise database, as opposed to multiple copies that can and do get out of sync with each other.

Infrastructure grids further simplify the business intelligence infrastructure by enabling the consolidation of both data marts and specialized business-intelligence processing such as OLAP and data-mining into a centralized database. Oracle's unique Real Applications Clusters architecture enables unlimited scalability and the ability to partition workloads across multiple nodes. Analytics may be executing on one set of nodes, ETL (Extraction, Transformation, and Loading) on another set, and data mining on yet another set, but with all users accessing the same database and viewing a consistent "single version of the truth."

In addition to RAC, OLAP, and Data-Mining, other key database features for business intelligence and data warehousing include advanced data partitioning, parallel operations, built-in ETL capabilities, and sophisticated SQL statistical and analytical capabilities. Oracle's extensive partitioning capabilities enable very large data sets to be easily managed with optimized performance and high availability. Parallel operations enable the power of multiple CPUs to be harnessed to execute single operations such as queries and loads. Advanced ETL features deliver scalable data movement and transformations capabilities for consolidating and loading data into the data warehouses. Oracle's industry leading security, availability, and manageability features are also vitally important for data warehouses and business intelligence.

Oracle Database 10g Release 1 delivered additional enhancements across all major areas of business intelligence:

Change data capture enables scalable, low latency extraction of data from archive logs with no impact on OLTP system performance.

Support for extremely large databases up to millions of Terabytes in size (8 Exabytes). The size of LOBs has also been extended into the

Terabytes and Automatic Storage Manager eliminates any file system storage limits.

Statistical analysis enhancements support additional descriptive statistics, correlations, and cross tabs, and provide new hypothesis testing and distribution fitting capabilities.

OLAP enhancements provide new analytic capabilities and the ability to partition analytic workspaces.

New in Release 2

Release 2 improves performance of sort operations, dramatically expands the number of partitions that can be created, offers new analytic capabilities, and improves the robustness of large DML operations.

Release 2 includes a number of data warehousing and business intelligence enhancements. The performance of sorting operations and aggregations has been increased up to five fold. The maximum number of partitions per table has been increased from 64,000 to 512,000 with ‘multidimensional’ partition-pruning to speed scan operations. New analytics include standard linear algebra libraries within PL/SQL, enhancements to the SQL model clause, and decision trees to help humans more readily understand complex data mining algorithms. Finally, large DML operations have been made more robust with error logging.

Unstructured Data Management

Oracle Database 10g Release 2 will be the first major commercial database to support the new XML Query standard.

More and more organizations are incorporating unstructured data management into their core systems architecture. Key developments in this area are the emergence of XML as a universal data model, dramatic advancements in intelligent search, and the integration of rich media support into mainstream applications. Key Oracle offerings in this area include XML DB, Oracle Text, Ultra Search, interMedia, and Spatial technologies.

New in Release 2

In Release 2, Oracle becomes the first mainstream commercial database to support the new XML Query standard. XML Query is designed to be a comprehensive query language for XML data just as SQL is the query language for much of the world’s structured data expressed as relational tables. Oracle’s high performance native XQuery engine compiles XQueries into the same internal data structures as SQL for high performance. Oracle also provides a downloadable XML Query mid-tier-based implementation that can be used to query across non-database sources.

In Release 2, tablespaces can be transported between databases while the databases are online.

Data Movement

Oracle Database 10g provides extensive facilities for moving data. This includes advanced facilities for efficiently and reliably importing/exporting data into and out of the database, transporting data at the file system level, and replicating data.

DataPump, new in Oracle Database 10g, imports and exports data into and out of Oracle Databases. Datapump imports data up to fifteen times faster and exports data up to 35% faster than earlier Oracle offerings and provides a wealth of new capabilities that add flexibility and reliability to import/export processes.

Transportable Tablespaces enable data to be efficiently ‘unplugged’ from one Oracle Database, copied at the file system level, and ‘plugged’ into another Oracle Database. In Oracle Database 10g Release 1, transportable tablespaces are enhanced to support data movement between systems with different hardware architectures and operating systems. For example, you can now quickly and easily move tablespaces from a Windows or Solaris system to a Linux system.

Streams is Oracle’s integrated facility for replicating data and messaging. In Oracle Database 10g, Streams performance and manageability were significantly improved, including support for additional Oracle datatypes.

New in Release 2

In Release 2, tablespaces can be transported between databases while the databases are online using Oracle Recovery Manager (RMAN). A new tablespace repository facility enables the storage and tracking of point-in-time copies of tablespace data for reporting, auditing, testing, and other uses. Whole databases can be transported between systems of the same endian hardware architecture. The performance and manageability of Streams and Datapump are also further improved.

Security

Already the industry leader in security, Oracle Database 10g further strengthens Oracle’s leadership position with many new enhancements. Extensions to Oracle’s row level security facility, Virtual Private Database, increase the granularity of security protections with column relevant security policies. Oracle’s auditing facility, important for compliance with Sarbanes-Oxley and other regulations, now includes capture of the executed SQL statement in the audit trail. Oracle’s fine grained auditing capabilities, for controlling auditing policies on a per table basis, have also been extended including support for fine grained auditing of insert, update, and delete operations. Enterprise user security enables implementation of easy to manage database user provisioning and authorization management for all databases in an enterprise. Security options available for the database provide industry standard strong authentication, industry standard network encryption and the ability to protect sensitive data such as medical records or national security using data classification.

Oracle Database 10g Release 2 supports transparent data encryption. Selected data can be encrypted and decrypted automatically without requiring any modification to application code.

New in Release 2

To help address privacy and regulatory compliance, Oracle Database 10g Release 2 supports Transparent Data Encryption. Sensitive data such as credit cards and social security numbers can be encrypted and decrypted automatically within the Oracle Database without requiring any modification to application code. Sensitive data on lost or stolen backup tapes will be protected. Usernames and passwords can be stored in Oracle Wallets to avoid hard-coding usernames / passwords in scripts and other programs. Oracle proxy enhancements allow users of tools such as SQL*Plus to login under their individual user ids and be automatically redirected to a different schema in the Oracle database. Also, enterprise user security enhancements provide greater flexibility for integration with existing PKI infrastructures.

Application Development

Oracle Database 10g provides the most comprehensive functionality for developing versatile, scalable, and high performance database applications for Grid computing. Highlights of new application development capabilities in Release 1 of Oracle Database 10g include the following:

Web Services support to enable the Oracle database to act as a Web services provider and consumer.

HTML DB to enable non-programmers, including DBAs, to easily develop database-centric web applications using only a web browser. It has all the developer productivity of desktop tools like Microsoft Access but is hosted on the enterprise infrastructure of the Oracle database for scalability, high availability, security, and more.

Regular Expressions / BLAST to provide powerful string manipulation capabilities for general purpose applications and advanced sequencing functions for biotech applications built into the Oracle database for maximum performance.

PL/SQL Performance gains that can double PL/SQL performance over Oracle9i Database Release 2

New in Release 2

Key application development enhancements in Oracle Database 10g Release 2 include:

.NET Development facilities that support Microsoft Visual Studio integration, callouts to the Common Language Runtime, and Fast Connection Failover for ODP.NET.

Table Update Notifications that can be used to invalidate caches used to improve website performance whenever data in a table is modified.

HTML DB has all the developer productivity of desktop tools like Microsoft Access but is hosted on the enterprise infrastructure of the Oracle database for scalability, high availability, security, and more.

Release 2 supports significant new .Net development capabilities, table update notification for website caches, and new JDBC connection pool load balancing.

RAC Load Balancing Advisory to enable JDBC and ODP.NET connection pools to optimally route work requests to the node in Oracle Real Application Cluster environments best able to handle the request.

Oracle Database 10g fundamentally changes the way data centers look and operate, dramatically reducing the cost of computing while raising quality of service to unprecedented new levels.

CONCLUSION

Oracle Database 10g fundamentally changes the way data centers look and operate. It transforms data centers from collections of separate, monolithic systems to a smaller number of consolidated, shared pools of server and storage resources called infrastructure grids. Oracle's unique scale-out architecture enables applications of all types to dynamically provision servers and storage resources as needed to meet their changing processing demands.

Grid computing represents the culmination of a long-term strategy to dramatically reduce the cost of computing while raising quality of service to unprecedented new levels. It involved a focus and a quantity and quality of work that no other database vendor can match. The infrastructure grid is something wholly new. It is a revolutionary step forward for Information Technology and for Oracle DBAs and Developers.



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