

INFORMATION DELIVERED RELIABLY

Oracle Database 11g: New Features Overview

Protect Information, Reduce Complexity,
and Adapt to Change

With databases tripling in size every two years, IT departments are facing both new and familiar challenges: How to maintain users' service levels in the event of server, storage, or site failures? How to prevent data breach and ensure regulatory compliance? How to store, manage, and protect all types of information, yet easily integrate it into routine business operations? How to scale large transactional and data warehousing systems while ensuring performance, reliability, and manageability? And how to upgrade software and hardware while minimizing the risk of change?

Oracle helps you address these challenges with a broad array of new features and enhancements in Oracle Database 11g. By extending Oracle's unique ability to deliver the benefits of grid computing, Oracle Database 11g enables you to improve user service levels, reduce downtime, and make more-efficient use of IT resources while you increase the performance, scalability, and security of your business applications 24/7.

Customers and partners began Oracle Database 11g beta testing in September 2006. It is expected to be available for production use in 2007.

Manage Availability and Performance with Oracle Enterprise Grids

Manageability

The manageability features in Oracle Database 11g are designed to help organizations easily manage infrastructure grids and successfully meet their users' service level expectations.

Oracle Database 11g's new manageability features and enhancements help you increase DBA productivity and reduce management costs while increasing the performance, scalability, and security of your business applications around the clock.

Four years ago Oracle introduced grid computing with Oracle Database 10g, fundamentally changing the way data centers looked and operated, and transforming them from silos of disparate resources to shared pools of servers and storage. By clustering low-cost commodity servers and modular storage arrays in a grid, organizations are able to build IT systems that deliver the highest levels of manageability, availability, and performance. Oracle Database 11g extends Oracle's unique ability to deliver the benefits of grid computing.

Meet Users' Service Level Expectations

Managing service level objectives is an ongoing challenge. Users expect fast, secure access to business applications 24/7, and IT managers must deliver without increasing costs and resources. The manageability features in Oracle Database 11g are designed to help organizations easily manage infrastructure grids and successfully meet their users' service level expectations. Oracle Database 11g's new manageability features and enhancements help you increase database administrator (DBA) productivity and reduce management costs while increasing the performance, scalability, and security of your business applications around the clock.

Minimize the Risk of Change with Real Application Testing

Oracle Database 11g lowers the cost of database upgrades and other hardware and operating system changes by making it significantly easier to test systems before and after the change so you can identify and fix problems. For example:

- Database Replay lets you easily capture actual production workloads at the database level and replay them on your test system so you can fully test the impact of system changes, including critical concurrency characteristics.
- SQL Performance Analyzer identifies structured query language (SQL) execution plan changes and performance regressions. Identified problems can then be fixed using SQL Tuning Advisor by either reverting to the original execution plan or by further tuning.

Boost DBA Productivity with Management Automation

Oracle Database 11g continues the effort—begun in Oracle9i Database and carried on through Oracle Database 10g—of dramatically simplifying and fully automating DBA tasks. New capabilities in Oracle Database 11g include

- Automatic SQL tuning with self-learning capabilities
- Automatic, unified tuning of both System Global Area (SGA) and Program Global Area (PGA) memory buffers

- New advisors for partitioning, data recovery, streams performance, and space management
- Enhancements to the Automatic Database Diagnostic Monitor (ADDM), which provide a better global view of performance in Oracle Real Application Clusters (Oracle RAC) environments and improved comparative-performance analysis capabilities

Achieve Faster Error Resolution with Fault Diagnostics

New fault diagnostic capabilities in Oracle Database 11g make it much easier for customers to capture the data Oracle Support needs when errors occur. This allows faster problem resolution with fewer demands on customers to reproduce problems.

Minimize the Cost of Downtime

In this 24/7 global economy, organizations can't afford IT systems that are down. Systems must be reliable and quickly recoverable in the event of failure. Oracle Database 11g protects systems from all common causes of planned and unplanned downtime, including server, storage, and site failures, as well as the biggest cause of all—human error. With Oracle Database 11g's high availability features, you can significantly reduce the risk of downtime and data loss.

Enable Rapid Data Recovery Through Oracle Data Guard

Oracle Data Guard coordinates the maintenance and synchronization of your database between local and remote servers for rapid recovery from disaster or site failure. Oracle Database 11g provides a number of significant Oracle Data Guard enhancements, including

- The ability to run real-time queries on a physical standby system for reporting and other purposes
- The ability to perform online, rolling database upgrades by temporarily converting a physical standby system to logical standby
- Snapshot standby to support test environments

In addition, performance for both physical and logical standby is improved. Logical standby now supports Extensible Markup Language (XML) Type character large object (CLOB) datatypes and transparent data encryption. Automatic fast-start failover is now supported for asynchronous transports.

Protection from Downtime

Oracle Database 11g protects systems from all common causes of planned and unplanned downtime, including server, storage, and site failures, as well as the biggest cause of all—human error.

Protect Data with Automatic Storage Management

With Automatic Storage Management, Oracle Database 11g automatically mirrors and balances data across the available storage devices to protect data and optimize performance—even when you add or remove new disks. Oracle Database 11g delivers several important high-availability enhancements for Automatic Storage Management, including

- Support for rolling upgrades
- Automatic bad-block detection and repair
- Fast mirror resync, which efficiently resynchronizes storage arrays that Automatic Storage Management mirrors when storage network connectivity is temporarily lost

Performance enhancements to Automatic Storage Management enable very large databases to open faster and reduce SGA memory consumption. They also allow DBAs to increase the storage allocation unit size to speed large sequential inputs/outputs (I/Os).

Significantly Increase Uptime

Oracle Database 11g enables you to apply many one-off database patches—including diagnostic patches—with no downtime, in both clustered and single-server environments. Additionally, a new data recovery advisor significantly reduces downtime by quickly identifying the root cause of failures, presenting the available recovery options to the DBA and, in some cases, automatically correcting the problem through self-healing mechanisms.

Speed Database Upgrades

With Oracle Database 11g, both patch set and release upgrades are now significantly faster through the use of parallelism and delayed compilation of PL/SQL objects.

Improve Online Operations

Oracle Database 11g includes a number of improvements to online redefinition operations, including

- Finer-grained dependency tracking, which allows the addition of new columns and procedures without incurring unnecessary recompilation of dependent objects
- Online alter table operations that are easier to execute
- Fast “add column” with default values
- Online index build with no pause to data manipulation language (DML) operations

Other High Availability Enhancements

Oracle Database 11g features other high availability enhancements, including

- Oracle Flashback Transaction Query, which provides push-button backout of rogue transactions with other dependent transaction changes
- Enhanced platform migration and data movement with more transportable options, including transportable partitions, schemas, and cross-platform databases
- Oracle Recovery Manager (RMAN) support for Windows Volume Shadow Copy Service (VSS) snapshots, resulting in tighter integration with Windows backup

Optimize Performance and Reliability

Compliance regulations, legal discoveries, and the trend toward consolidated data warehouses have caused databases to triple in size every two years, significantly impacting storage costs and the performance, reliability, and manageability of very large databases. Oracle Database 11g enables organizations to easily scale large transactional and data warehousing systems and deliver fast data access 24/7 using low-cost servers and modular storage. Oracle Database 11g offers new innovative features to further improve performance and scalability for the most demanding environments.

Safely Store All Your Data with SecureFiles

SecureFiles is Oracle's next-generation offering for storing large objects (LOBs), such as images, large text objects, or advanced datatypes—including XML, medical imaging, and geospatial raster objects—inside the database. SecureFiles offers excellent performance fully comparable to file systems. Additionally, it provides advanced functionality, such as intelligent compression, transparent encryption, and transparent deduplication.

Improve Performance and Minimize Storage Costs Through Compression for Online Transaction Processing

Oracle Database 11g supports data compression for update, insert, and delete operations commonly used in online transaction processing (OLTP) applications. Previous Oracle Database releases supported compression for bulk data-loading operations commonly used for data warehousing applications. Oracle Database 11g OLTP table compression improves database performance with more-effective use of memory for caching data and reduced I/O for table scans. With OLTP table compression, you can achieve two- to three-fold compression ratios with minimal processing overhead.

Industry-Leading Scalability and Performance

Oracle Database 11g lets organizations easily scale large transactional and data warehousing systems and deliver fast data access 24/7 using low-cost modular storage.

Oracle Database 11g's new, innovative performance features help administrators efficiently manage information load throughout the database's lifecycle by optimizing storage resources based on demand.

Even Better Performance for Oracle RAC

Oracle RAC reduces hardware costs by enabling you to build large systems out of small, low-cost servers. Oracle Database 11g optimizes the Oracle RAC cache fusion protocol to deliver even better performance for many common usage scenarios, such as access to read-mostly data, long-running queries, and access to LOB datatypes stored as SecureFiles.

Lightning Response with Result Caches

Result caches greatly speed the repeated execution of queries and function calls that access read-only or read-mostly data. The new server result cache stores the results of queries, query blocks, or PL/SQL function calls for immediate, transparent reuse by all users. The new client-side query cache eliminates round trips to the server by allowing users who share the same client application server to reuse the stored query results.

Increase Response Time with Oracle TimesTen

Oracle TimesTen In-Memory Database provides blazingly fast response times and real-time data caching. New Oracle TimesTen releases offer improved compatibility with Oracle datatypes, SQL, PL/SQL, Oracle Call Interface (OCI), globalization, and management infrastructures. These releases also provide more-sophisticated caching and failover capabilities to further improve performance and availability.

Other Performance Improvements

Oracle Database 11g features other high-performance improvements, including

- Automatic compilation for PL/SQL and Java in the database
- Faster triggers, including more-efficient invocations of per-row triggers
- Faster simple SQL operations
- Faster Oracle Data Guard and Oracle Streams replication
- Faster and more-reliable direct connections to network file system (NFS) storage devices
- Faster upgrades
- Faster backup/restore for large files
- Faster backup compression

Minimize the Complexity of Information Management

With Oracle Grid Computing as the foundation, Oracle Database 11g enables you to support fast and accurate business decisions at the lowest cost by managing all enterprise information with robust security, information lifecycle management, and integrated business intelligence analytics.

Support All Datatypes in a Single Database

Increasingly, organizations are recognizing the need to integrate different types of information—from office documents and spreadsheets to medical images and geographical data—into routine business operations. Storing, manipulating, and protecting all types of information in a common repository helps you dramatically reduce storage costs, thereby increasing your overall profitability.

Oracle Database 11g delivers a secure and scalable platform for reliable, fast access to all types of information using industry-standard interfaces. It enables robust content management of advanced datatypes—such as XML, spatial, multimedia, medical imaging, and semantic technologies—which are a rapid growth area for many enterprises.

XML

Oracle Database 11g provides new XML storage and query enhancements, including

- Binary XML storage and XML path indexing for schema-less XML documents
- Expanded support for standards, such as XML Query (XQuery) 1.0, Java Content Repository (JCR) 1.0, SQL:2007, and service-oriented architecture (SOA)
- XML repository enhancements such as events, XML Linking Language (XLink)/XML Inclusions (XInclude), and NFS 4.0
- Streams replication and logical standby support for XML Type (CLOBs)

Oracle Text

New Oracle Text enhancements include

- Query performance and scalability improvements
- Advanced multilingual search
- Online indexing operations
- Support for Oracle Enterprise Manager for ease of administration
- User-defined relevance scoring

Enhanced Information Access and Management

Oracle Database 11g delivers a secure and scalable platform for reliable, fast access to all types of information using industry-standard interfaces. It enables robust content management of advanced datatypes—such as XML, spatial, multimedia, medical imaging, and semantic technologies—which are a rapid growth area for many enterprises.

Oracle Spatial

Oracle Spatial enhancements include support for

- Richer, more-interactive map application development
- Web services application programming interfaces (APIs) for spatial operations
- Business intelligence tools integration
- Dynamic input for routing applications
- 3-D support for terrain and city models and virtual worlds

Multimedia and Medical Imaging

Oracle *interMedia* enhancements in Oracle Database 11g include

- A threefold performance improvement for common image-processing operations
- Large media handling (up to 128 terabytes) for broadcast, medical, and security applications
- Digital Imaging and Communications in Medicine (DICOM) medical imaging support for secure, multiterabyte regional and national archives
- Support for new Java Advanced Imaging (JAI) standards

Semantic Technologies

Oracle Database 11g is the industry's first open, scalable, secure, and reliable semantic database with native support for Resource Description Framework (RDF) and Web Ontology Language (OWL) standards, capable of managing datasets more than 10 times larger than specialized RDF and OWL databases. Oracle Database 11g provides more-complete and accurate querying capabilities, letting you easily extend existing SQL applications with semantic search and query.

Seamlessly Integrate All Your Information

To streamline your business processes and harness the information that makes your business unique, you must be able to easily integrate data of all types into the business processes you use every day using familiar application and desktop interfaces. Oracle Database 11g includes many new enhancements and features to help you better integrate data throughout the enterprise, reducing content management costs and increasing employee productivity.

Enhanced Streams Replication and Message Queuing

Oracle Database 11g enhances streams replication to provide a 30 to 50 percent performance improvement for SQL Apply and to support XML Type (CLOBs) and transparent data encryption.

New manageability improvements include

- Streams performance advisor
- Topology views
- Automatic Workload Repository (AWR) and ADDM support
- Data comparison utility and synchronous capture

New Advanced Queuing (AQ) features include

- Java Message Service (JMS) performance improvements
- Direct streams AQ support in Java Database Connectivity (JDBC)
- Scalable event notification

Support Legacy Databases with Oracle SQL Gateways

Enhancements to Oracle SQL gateways feature improved performance, enhanced statistic collection for better execution plans, and parallel operations for bulk load. New SQL gateways support legacy databases, such as Information Management Systems (IMS), Virtual Storage Access Method (VSAM), and Adaptable Database System (ADABAS).

Enable Enterprise Reach with Scheduler

Oracle Database 11g includes an enhanced scheduler that provides you with enterprise reach, letting you schedule both database- and operating-system-level jobs across distributed systems.

Improve Data Transfer with Oracle Net Services

Oracle has enhanced Oracle Net Services to support

- Improved performance for large data transfers
- Nonanonymous Lightweight Directory Access Protocol (LDAP) access for network naming
- Better diagnostics and tracing

Enterprisewide Data Integration

Oracle Database 11g includes many new enhancements and features to better integrate data throughout the enterprise, thereby reducing content management costs and increasing employee productivity.

Robust Security

Building on 30 years of secure practices, Oracle Database 11g helps you safeguard your information and ensure regulatory compliance with a host of robust security capabilities.

Reduce Risk with Sophisticated Security Capabilities

Organizations are increasingly finding that their information is at risk. Data breaches are extremely costly to organizations, sometimes crippling the viability of an entire enterprise. Additionally, compliance regulations such as Sarbanes-Oxley and the Payment Card Industry data security standard require that organizations securely protect their databases.

Building on 30 years of secure practices, Oracle Database 11g helps you safeguard your information and ensure regulatory compliance with a host of robust security capabilities, including

- Improved transparent data encryption to support tablespace encryption
- Tighter integration with hardware security modules for high-assurance master key protection
- Better support for LOB datatypes, LogMiner, and logical standby
- Improved manageability with comprehensive Oracle Enterprise Manager support for security functions
- Increased password security with support for case-sensitive, multibyte passwords, and strong password-hashing algorithms, such as Secure Hash Algorithm (SHA-1) and salt
- Additional secure-by-default configuration settings supporting password policies and audit options
- Strong authentication support for database system administrator (SYSDBA) and database system operator (SYSOPER) connections
- Enhanced support for Kerberos

Provide Comprehensive Information Lifecycle Management

To get the most value from your information at every point of its lifecycle, you need to provide different levels of accessibility to and protection for the data, based on its changing value to your organization. Oracle Database 11g enhances support for information lifecycle management (ILM), enabling you to ensure regulatory compliance, optimize storage, streamline business processes, and identify new revenue opportunities. Oracle Database 11g includes significant new ILM features, such as

- New partitioning capabilities, including
 - Partitioning by parent/child references
 - Partitioning by virtual columns

- More composite partitioning options, including range/range, list/range, list/hash, and list/list
- Interval partitioning, which allows you to automatically create new partitions based on intervals, such as every month or every day
- Support for transportable partitions so you can easily and efficiently move partitions between systems
- The Oracle ILM Assistant, which allows administrators to define ILM requirements for data placement, security, and regulatory compliance, in addition to providing timely advice and scripts to help the DBA meet these requirements

“Time Travel” with Oracle Flashback Data Archive

Oracle Database 11g also features Total Recall with Oracle Flashback Data Archive, which enables you to query data in selected tables “as of” earlier times in the past, thereby providing an easy, practical way to add a time dimension to your data for change tracking, ILM, auditing, and compliance. Oracle Flashback Data Archive provides automatic and efficient storage of “change” data to enable fast query access to old versions of the data. The DBA can set retention policies to automatically purge data when your system reaches specified age thresholds.

Turn Information into Insight with Built-in Business Intelligence

Lack of visibility into business operations results in lost revenue opportunities and lower operating margins. Yet with data spread across transactional, operational, and analytical systems, it is difficult to combine information into one place for reporting.

Oracle Database 11g enhances Oracle’s data warehousing (DW) and business intelligence (BI) capabilities to improve manageability and performance, and to make advanced technologies such as online analytical processing (OLAP) and data mining more easily accessible to mainstream users.

Improve Data Warehousing Manageability

Oracle Database 11g enables you to optimize Oracle Grid Computing to improve DW manageability through

- DW-specific management screens and comprehensive DW functionality, such as parallelism and partitioning, rendering Oracle Enterprise Manager fully “DW-aware”
- Improved ADDM support for Oracle RAC and parallel operations
- The integration of parallel operations with automatic workload management

Enhanced Data Warehousing and Business Intelligence

Oracle Database 11g enhances Oracle’s data warehousing and business intelligence capabilities to improve manageability, making advanced technologies such as online analytical processing and data mining more easily accessible to mainstream users.

Speed Complex Query Performance with Oracle OLAP

With Oracle Database 11g, Oracle OLAP capabilities are fully integrated with Oracle's materialized views (MVs) facility. You can automatically refresh Oracle OLAP cubes from relational data just like MVs, and transparently access cube data using SQL, through automatic query rewrite. By using Oracle OLAP cubes, you can achieve faster query performance, speed builds and maintenance of aggregates, and make advanced OLAP business calculations available via SQL.

Get Real-Time Business Insights Through Powerful Data Mining Capabilities

With Oracle Database 11g, Oracle Data Mining is easier to use and more powerful because of these capabilities:

- Automatic data preparation at the SQL/Java API level
- Improved Oracle Data Mining GUI management tools
- Tighter integration with the database
- SuperModels for combining data preparation processes with the mining model
- New generalized linear models
- More-predictive analytics

Shorten Application Development Time to Market

Oracle Database 11g provides a single integrated platform offering high performance and scalability for all the core technologies used by application developers today. Oracle Database 11g adds significant new capabilities to all the major application development environments, enabling you to shorten time to market and improve application performance.

PL/SQL

Oracle Database 11g delivers dramatic performance improvements with new "native" compilation of PL/SQL. Native compilation is easily turned on by setting a single parameter. There's no need for a C compiler, and there are no file system DLLs to manage. Native compilation can improve performance 50 to 100 percent for pure PL/SQL code and 10 to 30 percent for more typical application code containing SQL (when compared to noncompiled code). Other enhancements include

- Performance improvements for triggers
- Finer-grained dependency tracking
- Dynamic SQL enhancements
- A more powerful performance analysis tool

Java/JDBC

The new Java JIT (just-in-time) native compiler offers dramatic performance improvements and is fully automatic. Compared to previous native compilation (NCOMP) technology, JIT furnishes dramatic, out-of-the-box performance improvements—improving the speed for pure Java code by 100 percent, and for typical applications containing SQL by 30 to 100 percent. With Oracle Database 11g, you can

- Allow JIT compilation to happen “on the fly” as a background activity that is transparent to the user
- Eliminate the need for a C compiler
- Store compiled Java code persistently to avoid recompilations
- Enhance the user experience for traditional Java developers with a new Java Development Kit (JDK)-like interface
- Leverage new database features, such as database change notification, prefetch in first roundtrip, and Advanced Oracle Security for thin-client JDBC
- Improve performance with AQ/JMS operations
- Reduce database round trips

Oracle Database 11g is compliant with JDBC 4.0 and Java SE 5.0 for the JDBC drivers and Oracle Java Virtual Machine (JVM).

.NET and Windows

New Oracle Data Provider for .NET features in Oracle Database 11g include

- More-granular database change notification through row-level tracking changes
- Faster data access performance overall
- Support for 64-bit (x64 and Itanium) ActiveX Data Object (ADO) .NET
- Improved performance for Oracle Provider for OLE DB

Shorter Application Development Time

Oracle Database 11g provides a single, integrated platform that delivers high performance and scalability and supports all core technologies used by application developers today. Oracle Database 11g adds significant new capabilities to all the major application development environments, enabling you to shorten time to market and improve application performance.

New Windows features include

- Support for the Windows backup infrastructure with a Volume Shadow Copy Service (VSS) writer
- Improvements to Active Directory integration
- Support for Windows Vista

PHP

The new Database Resident Connection Pooling feature enables faster connections to the database for application environments, such as PHP Hypertext Preprocessor (PHP), that do not provide connection pooling.

Oracle SQL Developer

Oracle SQL Developer, Oracle's free database development productivity tool, includes the following features:

- Visual query building
- Migration workbench extension for databases, including SQL Server, MySQL, and Microsoft Access

Oracle Application Express

Oracle Application Express, Oracle's declarative, browser-based, rapid application development tool for building database-centric applications, will be enhanced in the Oracle Database 11g release timeframe with

- New, prepackaged applications for popular functions such as blogs, discussion forums, surveys, bug tracking, and storefront
- Reporting with Oracle Business Intelligence Publisher integration
- Microsoft Access migration aids
- Declarative Ajax support
- Drag-and-drop form layout

Advance Your Enterprise with Confidence

Oracle has been solving complex information management problems in governments and businesses around the world for over three decades, making our database the world's most popular software for collecting, managing, and protecting information. Oracle has always been a technology innovator, pioneering many of the industry's most successful data management concepts, including integrated data warehousing capabilities, support for varied datatypes and XML, and the revolutionary Oracle grid infrastructure technology.

Oracle Database 11g, the newest milestone in Oracle's database technology innovation, extends the benefits of grid computing to deliver the highest level of manageability, availability, performance, and security while minimizing complexity and reducing your overall cost of computing. Oracle Database 11g is upwardly compatible to protect your investment as your needs evolve. With Oracle Database 11g, you can confidently and profitably grow your enterprise as your requirements grow—now and for years to come.

Thirty Years—and Counting

Oracle has been solving complex information management problems in governments and businesses around the world for over three decades, making our database the world's most popular software for collecting, managing, and protecting information.

CONTACT US

For more information about how your organization can leverage the power of Oracle Database 11g, call **+1.800.ORACLE1** to speak to an Oracle representative, or visit oracle.com/database

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