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Glossary

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Preface

Note:

- Windows Multilingual User Interface Pack is supported on all Windows operating systems.
- In the 12.1 release, only the database client is supported on 32-bit Windows operating systems.

This Preface contains these topics:

- Audience
- Documentation Accessibility
- Accessing Documentation
- Related Documents
- Conventions

Audience

This guide is intended for database administrators, network administrators, security specialists, and developers who use Oracle Database for Windows.

To use this document, you need:

- Oracle-certified Windows operating system software installed and tested
- Knowledge of object-relational database management concepts

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at
http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

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Accessing Documentation

The Oracle Database Online Documentation Library for Windows is not shipped with Oracle Database for Windows. Everything in the library is available for download from the Oracle Technology Network (OTN) at
http://www.oracle.com/technetwork/indexes/documentation/index.html

Related Documents

For more information, see the following documents in the Oracle Database documentation set:

- *Oracle Database Installation Guide for Microsoft Windows*
- *Oracle Database Platform Guide for Microsoft Windows*
- *Oracle Database Concepts*

Many books in the documentation set use the sample schemas of the seed database, which is installed by default when you install Oracle Database. See *Oracle Database Sample Schemas* for information about how these schemas were created and how you can use them yourself.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Changes in This Release for Oracle Database Platform Guide

This preface describes new and deprecated features of Oracle Database and provides pointers to additional information.

Changes in Oracle Database 12c Release 1 (12.1)

The following are changes in *Oracle Database Platform Guide* for Oracle Database 12*c* Release 1 (12.1).

- New Features
- Deprecated Features
- Desupported Features

New Features

The following features are new in this release:

- Support of Oracle Home User on Windows

  Starting with Oracle Database 12*c* Release 1 (12.1), Oracle Database supports the use of Oracle Home User, specified at the time of installation. Oracle Home User is used to run Windows services for the Oracle home. Oracle Home User is associated with an Oracle home and cannot be changed post installation. On a system, different Oracle homes can share the same Oracle Home User or use different Oracle Home User names.

  Oracle Home User can be a Windows built-in account or a Windows User Account. For enhanced security, Oracle recommends that the standard Windows User Account be chosen as the Oracle Home User for Oracle Database installations. The primary purpose of Oracle Home User is to run Windows services with Windows User Account. This user account (Oracle Home User) must be a standard Windows user account (not an Administrator). Windows User Account can be a Local User, a Domain User, or a Managed Services Account.

  Note: See the Microsoft documentation for more information on different types of Windows user accounts.

  This release has also introduced a new Windows utility called the Oracle Home User Control. This is a command-line tool that displays the Oracle Home User name associated with the current Oracle home and updates the password for the Windows User Account used as Oracle Home User.

See Also:

- "Supporting Oracle Home User on Windows" on page 3-1
- "Running Tools with Windows User Account Control" on page 2-4
- "Using the Oracle Home User Control Tool" on page 2-9
- "Managing Oracle Home User" on page 3-2
- "Overview of Database Creation on Windows Using Oracle Database Configuration Assistant" on page 4-1
- "About Creating and Starting an Oracle Database Service" on page 4-7
- "About Administering an Oracle Database Instance Using ORADIM" on page 4-12
- "Creating an Instance Using ORADIM" on page 4-13
- "Overview of Operating System Authentication Enabled at Installation" on page 10-3
- "About Listener Requirements" on page B-2
- "Running Windows Services" on page C-1
- *Oracle Database Installation Guide for Microsoft Windows*
- *Oracle Data Guard Concepts and Administration*
- *Oracle Database Administrator's Guide*

- Oracle ASM File Access Control on Windows

  Oracle Automatic Storage Management (Oracle ASM) File Access Control restricts the access of files to specific Oracle ASM clients that connect as `SYSDBA`. An Oracle ASM client is typically a database, which is identified as the user that owns the database instance home.

  Starting with Oracle Database 12*c* Release 1 (12.1), Oracle supports the use of standard Windows User Account instead of Local System Account to run Oracle Database services that lets you use separate users for different Oracle databases. This release also supports Oracle ASM disk group file-level access control and privilege separation.

  The Oracle ASM File Access Control feature helps to replace the current user with a new user and allows the user to change ownership, group membership, and permissions of a file while the file is open by one or more Oracle ASM clients. This release onwards, the Windows User Accounts used as Oracle Home Users are restricted from directly accessing Oracle ASM storage devices and can be accessed through the Oracle Database services that have sufficient privileges to run that service.

  Oracle ASM disk group users now manage ASM disk group user replacement with new ASMCMD commands and SQL statements.

See Also:

- "Oracle Automatic Storage Management File Access Control" on page 1-2
- "Migration Considerations" on page 4-17
- "Managing New Users and User Groups" on page 11-30
- "ORA-15252 to ORA-15266: User Replacement Failure on Windows" on page D-1
- "ORA-15301 to ORA-15302: Failure to Modify Ownership, Group, and Permission of Opened Files" on page D-2
- *Oracle Automatic Storage Management Administrator's Guide*
- *Oracle Database Installation Guide for Microsoft Windows*

- Oracle Enterprise Manager Database Express 12*c*

  Oracle Database 12*c* introduces Oracle Enterprise Manager Database Express 12*c*, a web-based management tool built into Oracle Database without any need for special installation or management. Using Oracle Enterprise Manager Database Express 12*c*, you can perform basic administrative tasks such as user, performance, memory, and space management. You can also view performance and status information about your database.

  See Also:

  - *Oracle Database 2 Day DBA*
  - *Oracle Database Installation Guide*

- Support of Oracle Home User for Oracle Net Services

  Oracle Database 12*c* supports Oracle Net services such as Oracle Listener, CMADMIN, and CMAN Proxy Listener to run under Oracle Home User account specified during Oracle Database installation. In earlier releases, Oracle Net services ran under the high-privileged, Windows built-in Local System Account (LSA).

  See Also:

  - "Running Oracle Net Services" on page B-2
  - *Oracle Database Net Services Administrator's Guide*
  - *Oracle Database Net Services Reference*

- Securing External Procedures

  Starting with Oracle Database 12*c* Release 1 (12.1), a `LIBRARY` object can be defined using either an explicit path or a `DIRECTORY` object. You can also use the `CREDENTIAL` clause to specify the operating system user.

  See Also:

  - "Registering an External Procedure" on page 17-6
  - *Oracle Database Security Guide*
  - *Oracle Database Concepts*

- Support for Separation of Database Administration Duties

  Oracle Database 12*c* provides support for separation of database administration duties for Oracle Database by introducing task-specific and least-privileged administrative privileges that do not require the `SYSDBA` administrative privilege. These new privileges are: `SYSBACKUP` for backup and recovery, `SYSDG` for Oracle Data Guard, and `SYSKM` for encryption key management.

  See Also:

  - *Oracle Database Installation Guide*
  - *Oracle Grid Infrastructure Installation Guide*
  - *Oracle Database Administrator's Guide*
  - *Oracle Database Security Guide*

Deprecated Features

The following feature is deprecated in this release, and might be desupported in a future release:

Windows NTS Authentication Using the NTLM Protocol

The NTS authentication adapter no longer supports the use of the NT LAN Manager (NTLM) protocol to authenticate Windows domain users. Thus the NTS adapter cannot be used to authenticate users in old Windows NT domains or domains with old Windows NT domain controllers. However, local connections and Oracle Database services running as a Windows Local User continues to be authenticated using NTLM. A new client-side `sqlnet.ora` boolean parameter, `no_ntlm` (default value is `FALSE`) allows you to control if NTLM can be used in NTS authentication. When the parameter is set to `TRUE`, NTLM cannot be used in NTS authentication.

See Also: "About Windows Authentication Protocols" on page 10-1

Desupported Features

The following features previously described in this guide are no longer supported by Oracle. See *Oracle Database Upgrade Guide* for a list of desupported features.

- Oracle Enterprise Manager Database Control
- Oracle COM Automation
- Oracle Objects for OLE
- Oracle Counters for Windows Performance Monitor
- Raw Devices

1

Oracle Database Architecture on Windows

This chapter describes how Oracle Database architecture takes advantage of some more advanced **services** in Microsoft Windows operating systems.

This chapter contains these topics:

- Overview of Oracle Database on Windows Architecture
- Overview of Oracle Database Scalability on Windows
- Oracle Database Integration with Windows
- Other Sources of Information

1.1 Overview of Oracle Database on Windows Architecture

Oracle Database on Windows is a stable, reliable, and high-performing system upon which you can build applications. Each release of the database provides new platform-specific features for high performance on Windows.

Oracle Database operates the same way on Windows as it does on other platforms. The architecture offers several advantages on Windows, such as:

- Oracle Automatic Storage Management
- Oracle Automatic Storage Management File Access Control
- Thread-Based Architecture
- File I/O Enhancements

1.1.1 Oracle Automatic Storage Management

Oracle Automatic Storage Management (Oracle ASM) is an integrated file system and volume manager expressly built for Oracle Database files. Oracle ASM provides the performance of raw I/O with the easy management of a file system. It simplifies database administration by eliminating the need for you to directly manage potentially thousands of Oracle Database files. It enables you to divide all available storage into disk groups. You manage a small set of disk groups, and Oracle ASM automates the placement of the database files within those disk groups.

Oracle recommends that you use Oracle ASM instead of raw files to store data files. It provides the performance benefits of raw files with much better manageability. Oracle ASM is available for both single instance and Oracle Real Application Clusters (Oracle RAC) databases.

You can store Oracle Cluster Registry and voting files in Oracle ASM disk groups and store database data files in the `data` disk group. The voting files and Oracle Cluster Registry are two important components of Oracle Clusterware.

Note:

- You must be logged on either as Administrator or a user name that is a member of the Administrators group.
- To open Disk Management console, click **Start**, **Run**, and then enter: `diskmgmt.msc`.
- Storing data files on raw devices is no longer supported. You must use a file system or Oracle Automatic Storage Management.
- NFS or Direct NFS cannot be used for Oracle Clusterware files.

See Also:

- Appendix A, "Storing Tablespaces on Raw Partitions"
- *Oracle Automatic Storage Management Administrator's Guide*
- *Oracle Database Administrator's Guide*

1.1.2 Oracle Automatic Storage Management File Access Control

Oracle ASM File Access Control restricts the access of files to specific Oracle ASM clients that connect as `SYSDBA`. An Oracle ASM client is a database, which is identified by the name of the user that owns the database instance home. Oracle ASM File Access Control uses this user name to identify a database. Oracle ASM File Access Control restricts access based on the operating system and effective user identification number of a database owner.

1.1.2.1 Creation of New User Groups and Users for Separation of Database Administration Duties

Oracle Database 12*c* Release 1 (12.1) provides access control to separate the roles on Windows. With Oracle Database services running under the Oracle Home User account instead of the Local System Account, the Oracle ASM access control feature must be enabled to support role separation on Windows. In previous releases, this feature was disabled on Windows because all Oracle Database services ran under Windows Built-in Local System Account.

The new user groups added in Oracle Database 12*c* Release 1 (12.1) are `ORA_`*`HOMENAME`*`_DBA`, `ORA_`*`HOMENAME`*`_OPER`, `ORA_`*`HOMENAME`*`_SYSBACKUP`, and so on. For Oracle ASM administration, new groups `ORA_ASMADMIN`, `ORA_ASMDBA` and `ORA_ASMOPER` are automatically created and populated during Oracle Database installation. The Oracle ASM administrator can manage these Windows groups using Windows tools, though you must ensure that the required user names are not removed from these groups.

See Also:

- "Managing New Users and User Groups" on page 11-30
- *Oracle Database Installation Guide for Microsoft Windows*
- *Oracle Grid Infrastructure Installation Guide*

1.1.2.2 About Disk Group User Replacement

Starting with Oracle Database 12*c* Release 1 (12.1), the identity of an Oracle ASM user can be changed from one operating system user to another operating system user. It enables end users to change the identity of an Oracle ASM user without having to delete and re-create the user, which requires dropping all the files a user owns. This feature improves the manageability of Oracle ASM users and the files they own. A new SQL Statement (`ALTER DISKGROUP REPLACE USER`) and a new ASMCMD command (`rpusr`) have been added to support user replacement in a disk group.

See Also: *Oracle Automatic Storage Management Administrator's Guide*

1.1.2.3 About Changing File Access Control While the File is Open

Oracle Database 12*c* Release 1 (12.1) enables users to change the ownership, permissions, or group membership of a file even while the file is open. Since this release, the ASMCMD file access control commands, such as `chgrp`, `chmod`, and `chown`, can run even while the file is open. The SQL statements, such as `ALTER DISKGROUP MODIFY USERGROUP` commands have also been modified as these SQL statements provide support for these ASMCMD commands.

See Also: *Oracle Automatic Storage Management Administrator's Guide*

1.1.3 Thread-Based Architecture

The internal **process** architecture of Oracle Database is **thread**-based. Threads are objects within a process that run program instructions. Threads allow concurrent operations within a process so that a process can run different parts of its program simultaneously on different processors. A thread-based architecture provides the following advantages:

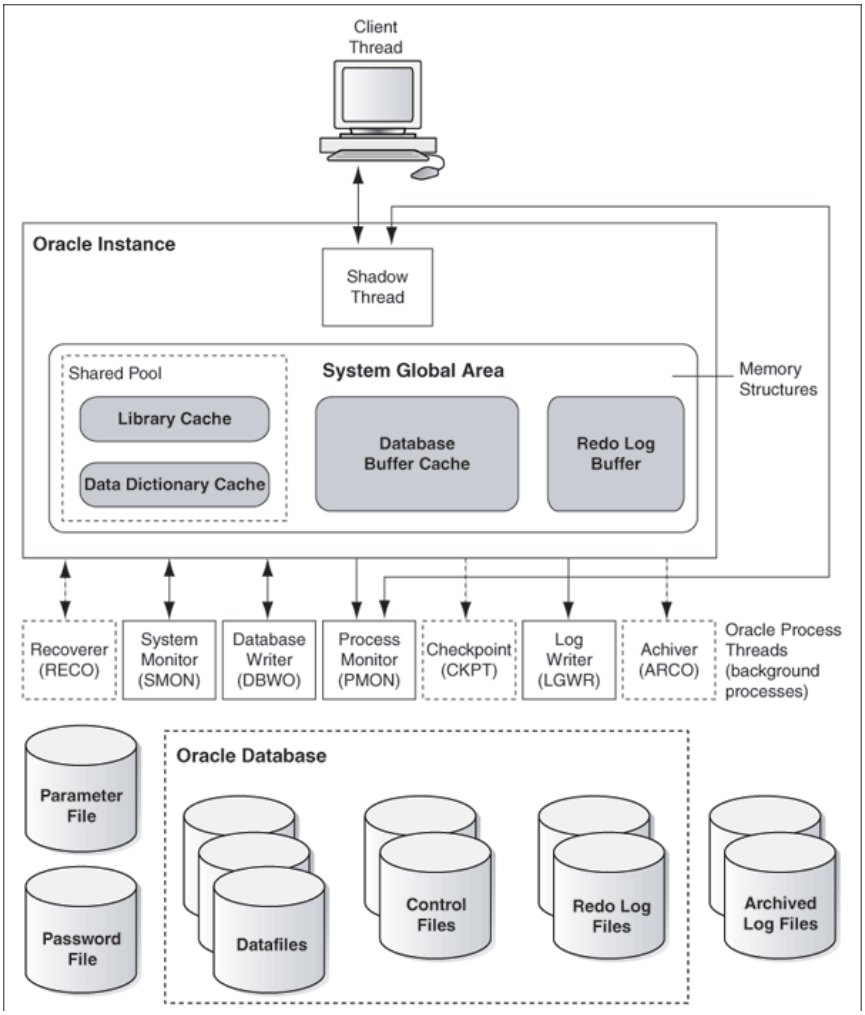
- Faster context switching
- Simpler **System Global Area** allocation routine, because it does not require use of shared memory
- Faster spawning of new connections, because threads are created more quickly than processes
- Decreased memory usage, because threads share more data structures than processes

Internally, the code to implement the thread model is compact and separate from the main body of Oracle Database code. Exception handlers and routines track and deallocate resources. They add robustness, with no downtime because of resource leaks or program that does not function as expected.

Oracle Database is not a typical Windows process. On Windows, an Oracle Database or Oracle Automatic Storage Management **instance** (threads and memory structures) is a Windows service: a background process registered with the operating system. The service is started by Windows and requires no user interaction to start. This enables the database to open automatically at computer startup.

When running multiple Oracle Database or Oracle Automatic Storage Management instances on Windows, each instance runs its own Windows service with multiple component threads. Each thread might be required for the database to be available, or it might be optional and specific to certain platforms. The background processes read and write from various data files, depending on your configuration. Oracle Database architecture on Windows is illustrated in Figure 1–1. Examples of Oracle Database required threads on Windows are listed in Table 1–1.

Figure 1–1 Oracle Database Architecture on Windows



Oracle Database architecture on Windows. An Oracle instance is shown as a Windows service (a background process registered with the operating system). The service is started by Windows and requires no user interaction to start. It contains the memory structures and threads needed to access the database.

The client connects through a **shadow thread** to the Oracle instance. The **shadow thread** connects directly with the **process monitor**. The memory structures include a shared pool of a **library cache** and a **data dictionary cache**, a **database buffer cache**, and a **redo log buffer**.

The threads include the **database writer**, **log writer**, **process monitor**, **system monitor**, **checkpoint process**, **distributed recovery process** (all required while the database is available), and **archive process** (optional while the database is available).

There is an Oracle Database containing **data files**, **control files**, and **redo log files**. Associated with the database is the **parameter file**, **password file**, and **archived log files**.

****

Table 1–1 Oracle Database Threads

Oracle Database Thread	Description	Required/Optional
DBWO	database writer	Required
LGWR	log writer	Required
MMAN	memory manager process	Required
PMON	process monitor	Required
PSPO	process spawner process	Required
SMON	system monitor	Required
CKPT	checkpoint process (thread on Windows) that runs by default on Windows	Required
ARCO	archive process (or thread on Windows)	Required
RECO	distributed recovery background process	Required

Note: You can view running background processes by entering the following query:

```
SQL> select * from v$bgprocess where paddr <> '00';
```

Oracle Database for Windows is supplied as a set of executables and dynamic link libraries (DLLs). Executable images can be modified using `ORASTACK` to change the size of the stack used by the threads of the Oracle Database process. Oracle recommends that you use this tool only under the guidance of Oracle Support Services.

1.1.4 File I/O Enhancements

Oracle Database supports 64-bit file I/O to allow use of files larger than 4 gigabytes (GB). In addition, physical and logical raw files are supported as data, log, and **control files** to support Oracle Real Application Clusters (Oracle RAC) on Windows and for those cases where performance must be maximized.

Starting with Oracle Database 11*g*, instead of using the operating system kernel NFS client, you can configure Oracle Database to access NFS V3 servers directly using an Oracle internal Direct NFS client. Through this integration, Oracle can optimize the I/O path between Oracle and the NFS server, resulting in significantly superior performance. In addition, Direct NFS client simplifies and optimizes the NFS client configuration for database workloads.

Volumes mounted through CIFS cannot be used for storing Oracle database files without configuring the Direct NFS client. The atomic write requirements needed for database writes are not guaranteed through the CIFS protocol. Consequently, CIFS can be used only for operating system-level commands such as, copy, move, and so on.

The Direct NFS client currently supports up to four parallel network paths to provide scalability and high availability. The Direct NFS client delivers optimized performance by automatically load balancing requests across all specified paths. If one network path fails, then the Direct NFS client resends commands over any remaining paths ensuring fault tolerance and high availability.

A new parameter called `dnfs_batch_size` has been added starting with Oracle Database 12*c* Release 1 (12.1) to control the number of asynchronous I/O operations

that can be queued by an Oracle process when the Direct NFS client is enabled. Set this parameter only if the Direct NFS client is overwhelming the NFS server or the network. This parameter helps the user to manage the load that the Direct NFS client can generate. In typical environments, you must not set this parameter. The default value of this parameter is 4096. To reduce the Direct NFS client load, Oracle recommends a value of 128 that can be changed based on the NFS server performance.

> **See Also:** Your vendor documentation to complete NFS configuration and mounting

1.2 Overview of Oracle Database Scalability on Windows

Features in Oracle Database and in the Windows operating system work together to help increase scalability, throughput, and database capacity. One of the feature has been explained below.

1.2.1 Large User Populations

Several features allow Oracle Database to support an increasingly large number of database connections on Windows:

- The **Shared Server Process**, limits the number of threads needed in the Oracle Database process and supports over 10,000 simultaneous connections to a single database instance.
- **Oracle Net** multiplexing and connection pooling features allow a large configuration to connect more users to a single database instance.
- Oracle RAC raises connection counts dramatically by allowing multiple server computers to access the same database files, increasing the number of user connections by tens of thousands while increasing throughput.

Note: Oracle RAC is only supported on 64-bit Windows server operating systems.

1.3 Oracle Database Integration with Windows

Oracle Database is increasingly integrated with Windows, easing maintenance, and improving enterprise-level deployment in security, directory, and transaction services. Integration features in Oracle Database include:

- Oracle PKI Integration with Windows
- Oracle Services for Microsoft Transaction Server
- Oracle Fail Safe Integration with Windows

1.3.1 Oracle PKI Integration with Windows

Oracle Advanced Security includes **Oracle PKI** (public key infrastructure) integration for authentication and single sign-on. You can integrate Oracle-based applications with the PKI authentication and encryption framework, using Oracle Wallet Manager.

1.3.2 Oracle Services for Microsoft Transaction Server

Microsoft Transaction Server (MTS) is used in the middle tier as an application server for **COM** objects and transactions in distributed environments. Oracle Services for

Microsoft Transaction Server allows Oracle Database to be used as a resource manager in Microsoft Transaction Server-coordinated transactions, providing strong integration between Oracle solutions and Microsoft Transaction Server. Oracle Services for Microsoft Transaction Server can operate with Oracle Database running on any operating system.

Oracle Database takes advantage of a native implementation and also stores **recovery** information in Oracle Database itself. Oracle Services for Microsoft Transaction Server allows development in all industry wide data access interfaces, including **Oracle Call Interface** (OCI), ActiveX Data Objects (ADO), OLE DB, and Open Database Connectivity (ODBC). The Oracle APIs, Oracle Data Provider for .NET and OCI, offer greatest efficiency.

1.3.3 Oracle Fail Safe Integration with Windows

Oracle Fail Safe ensures that Oracle Database (and also other Oracle and third-party applications) can be configured and managed for high availability on Windows clusters. An instance runs on only one node at a time.

A cluster is a group of independent computing systems that operates as a single virtual system, eliminating individual host systems as points of failure. Oracle Fail Safe works with Microsoft Windows Failover Clusters to ensure that if a failure occurs on one cluster system, then workloads running on that system fail over quickly and automatically to a surviving system. Oracle Database combined with Oracle Fail Safe on a Windows cluster ensures protection from both hardware and software failures.

For well-configured solutions, Oracle Fail Safe ensures a surviving system to be operational in less than a minute, even for heavily used databases.

Note: Windows server operating systems support the clustering technology. The Oracle Fail Safe Manager client can be installed on Windows Server operating systems (such as Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, and Windows Server 2012 R2 x64) and on client systems (such as Windows 7, Windows 8, and Windows 8.1).

See Also: The Oracle Fail Safe documentation set, which is available on separate media in the Oracle Database media pack

1.4 Other Sources of Information

See the following sources for additional information:

- Appendix E, "Oracle Database Differences on Windows and UNIX"
- Chapter 2, "Database Tools on Windows"
- Chapter 3, "Supporting Oracle Home User on Windows"
- Chapter 17, "Developing Applications for Windows" for more information about Oracle Database integration with Windows features