Oracle Database 12c on Windows

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Program Agenda

- Windows Platform support
- Oracle Home User support
- Performance
- Security
- Oracle RAC
- Microsoft Cluster Services Support
- .NET Application Development
- Q&A
Windows 8 and Windows 2012

Supported Editions

- Windows 8 Editions
  - Windows 8 Pro
  - Windows 8 Enterprise

- Windows Server 2012 Editions
  - Essentials
  - Foundation
  - Standard
  - Datacenter
### Windows 32-bit Platform Support

<table>
<thead>
<tr>
<th>OS</th>
<th>10gR2</th>
<th>11gR1</th>
<th>11gR2 #2</th>
<th>12cR1 #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows XP Professional #1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Windows Server 2003 and Windows Server 2003 R2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Windows Vista #1</td>
<td>10.2.0.4</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Windows 7 #1</td>
<td>10.2.0.5</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows Server 2008</td>
<td>10.2.0.4</td>
<td>11.1.0.7</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows Server 2008 R2</td>
<td>10.2.0.5</td>
<td>11.1.0.7</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows 8 #1</td>
<td>No</td>
<td>No</td>
<td>Planned in Patchset</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows Server 2012</td>
<td>No</td>
<td>No</td>
<td>Planned in Patchset</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#1 RAC and some other features not supported on Windows client systems

#2 RAC not supported for 32-bit Windows in 11gR2 and later

#3 Only Database Client is supported for 32-bit Windows in 12c and later
## Windows 64-bit (x64) Platform Support

<table>
<thead>
<tr>
<th>OS</th>
<th>10gR2</th>
<th>11gR1</th>
<th>11gR2</th>
<th>12cR1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows XP (#1), Windows Server 2003, and Windows Server 2003 R2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Windows Vista #1</td>
<td>10.2.0.4</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Windows 7 #1</td>
<td>10.2.0.5</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows Server 2008</td>
<td>10.2.0.4</td>
<td>11.1.0.7</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows Server 2008 R2</td>
<td>10.2.0.5</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows 8 #1</td>
<td>No</td>
<td>No</td>
<td>Planned in Patchset</td>
<td>Yes</td>
</tr>
<tr>
<td>Windows Server 2012</td>
<td>No</td>
<td>No</td>
<td>Planned in Patchset</td>
<td>Yes #2</td>
</tr>
</tbody>
</table>

Windows 32-bit Client is also supported on x64 systems

#1 RAC and some other features not supported on Windows client systems

#2 Single Instance and Client support only; RAC support planned in a future patchset
Hyper-V and Windows Azure Certification

- **Windows 2012 Hyper-V**
  - DB 12cR1 (Single Instance) certified on Windows 2012 guest OS
  - DB 12cR1 (Single Instance) planned to be certified on Windows 2008R2 guest OS in a future patchset
  - DB 11gR2 (Single Instance) planned to be certified on Windows 2008R2 and Windows 2012 guest operating systems in a future patchset

- **Windows Azure**
  - DB 12cR1 (Single Instance) on Windows 2012 and Oracle Linux 6.4 (Preview)
  - DB 11gR2 (Single Instance) on Windows 2012 and Windows 2008R2 planned in future
Program Agenda

• Windows Platform support
• Oracle Home User support
• Security
• Performance
• Oracle RAC
• Microsoft Cluster Services support
• .NET Application Development
• Q&A
Oracle Home User Support

• Run Windows Services for Oracle using a standard Windows account

• Specify a standard (not an administrator) Windows User Account as Oracle Home User during install and upgrade
Services run as a Windows User (e.g. domain1\frank)
Each service also has a unique Service SID (e.g. Database sid orcl has service SID: NTAUTHORITY\OracleServiceORCL)
Access controlled by File System ACLs
Oracle sets appropriate ACLs for Oracle Home and Oracle Base
For customer specific files/directories in non-standard locations, ACLs may need to be changed to make them accessible to Oracle Services
Either user name or Service SID can be used to grant privileges or set ACLs

Please check Oracle Database Platform Guide 12.1 for Microsoft Windows for more information.
Database Server Install

Oracle recommends that you specify a standard Windows User Account (not an Administrator account) to install and configure the Oracle Home for enhanced security. This account is used for running the Windows Services for the Oracle Home. Do not log in using this account to perform administrative tasks.

- **Use Existing Windows User**
  - User Name: 
  - Password: 

- **Create New Windows User**
  - User Name: 
  - Password: 
  - Confirm Password: 
  - The newly created user is denied Windows login privileges.

- **Use Windows Built-in Account**
Oracle Home User

- Services for the Oracle Home run with this user name
- Can be Windows Built-in Account or a standard Windows User Account
- Can not be changed post install
- Different from Oracle Installation User who must have OS administration privileges
- Have similarities with ‘oracle’ user on Linux, though you can not log in as the Oracle Home User on Windows and perform administration tasks (e.g. Create DB, Install, Upgrade)
## Install

- Only OS Administrators can install Oracle

<table>
<thead>
<tr>
<th>Windows Account option for Oracle Home User</th>
<th>DB Server (Single Instance)</th>
<th>DB Client</th>
<th>DB Server (RAC)</th>
<th>Grid Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built-in Account</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y *</td>
</tr>
<tr>
<td>Local User Account (Enter user id and password)</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Managed Services Account (Enter user id only)</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Domain Account (Enter user id and password)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

* If Grid Infrastructure Management Repository option is used, Built-in account option is not allowed
Database Client Install

- For Built-in Account option, Windows Services run under LocalService (not LocalSystem) for Database Client.
Oracle Grid Infrastructure Install

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 5 of 10

Specify Oracle Home User

As part of setting up Grid Infrastructure software you can optionally configure Grid Infrastructure Management Repository that will assist in the management operations of Oracle Grid Infrastructure.

If you plan to use Grid Infrastructure Management Repository, it is mandatory to specify a standard Windows Domain User Account (not an Administrator account) to install and configure the Oracle Home. The account is used for running the Windows Services for the Grid Infrastructure Management Repository. Do not log in using this account to perform administrative tasks.

- Use Existing Windows User
  - User Name:
  - Password:
- Create New Windows User
  - User Name:
  - Password:
  - Confirm Password:

The newly created user is denied Windows logon privileges.

- Use Windows Built-in Account

Help < Back Next > Install Cancel
Database Creation

• Database Configuration Assistant (DBCA) is used to create or modify Oracle Database as a part of install or as post install action
• Administrators, invoking the tools, need to be an OS Administrator and should have appropriate database privileges
• Use the icon Database Configuration Assistant created during Oracle Database install (the icon is set up to “run as administrator”)
• As Windows Service creation requires both user id and password, DBCA will ask for the password of Oracle Home User (if needed) in order to create the Windows Service
  • For Single Instance DB, password needed for Windows Local User and Domain User
  • For RAC, the customer has the option to store password in wallet; if not stored, the password needs to be input for Windows Domain User
Oracle Database Upgrade
Oracle Home and Database Upgrade

• Database Upgrade Assistant (DBUA) is used for database upgrade across Oracle Homes as a part of install or as post install action
• Administrator, invoking the tools, needs to be an OS Administrator and should have appropriate database privileges
• Use the icon *Database Upgrade Assistant* created during Oracle Database install (the icon is set up to “run as administrator”)
• Requirement to enter Oracle Home User and Password is similar to Database creation
  • When a database is upgraded, it will ask for password of Oracle Home User (if needed)
Administration Tools

- All GUI tools (e.g. DBCA, NETCA) enhanced to support Oracle Home User and ask for password if needed
- All command line tools (e.g. ORADIM, LSNRCTL, CMCTL) enhanced to accept Oracle Home User name and password through stdin for service creation
- Silent Install and Cloning enhanced to support Oracle Home User
- CRSCTL can be used to create wallet for storing password of Oracle Home User (RAC environment)
- Enterprise Manager support of Oracle Home User for provisioning, patching, and service creation
Management of Oracle Home User

- As it is a standard Windows user, Windows tools can be used to manage the Windows account (e.g. add privileges, change password)
- For changing password of the Oracle Home User account
  - Use Windows tools to change the password
  - Windows also requires all Windows Services to be updated in order to use the new password
  - For all Windows Services used by Oracle, you can use the icon Update Password for Oracle Home User to:
    - update password for all Windows services used by Oracle on a computer (Single Instance Database or Client)
    - change password in Oracle wallet and update password for all Windows services used by Oracle in a cluster (for RAC)

You can also use the tool Oracle Home User Control (orahomeuserctl) in command line (run as administrator)
Program Agenda

- Windows Platform support
- Oracle Home User support
- Performance
- Security
- Oracle RAC
- Microsoft Cluster Services support
- .NET Application Development
- Q&A
Large Pages Support

• Improve performance with large pages support
  • 2 MB Page size (instead of 4 KB)
• If Oracle Home User is a standard Windows account, the administrator must grant the "Lock pages in memory" privilege to Oracle Home User or Service SID of Oracle Database Service (NTAUTHORITY\OracleService<sid>)
Large Pages Support

- Under HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_HOMENAME
  - Create ORA_LPENABLE or ORA_SID_LPENABLE
  - Set the value to 1 for regular mode and 2 for mixed mode
  - Mixed mode is the new option to allow use of large pages but fall back to small pages if OS is not able to allocate large pages
  - ORA_SID_LPMAXTIME is the optional time parameter for mixed mode
    (if a server has been running for some time and memory is fragmented, OS may fail to allocate large pages; mixed mode can be used to ensure that DB comes up in such cases)
Direct NFS Client on Windows

- Network Attached Storage (NAS) uses Network File System (NFS)
- Oracle Database 11g allows direct Windows NFS v3 access
  - Part of DB kernel in Oracle Disk Manager library
  - Bypasses a lot of software layers in OS
  - Tailored for the specific I/O patterns that Oracle uses
  - Linear scalability of direct NFS can be achieved with inexpensive NICS
- Database 12c
  - `dnfs_batch_size` can be used on Windows systems that don't have enough bandwidth to throttle the number of IOs queued to the system, which may improve overall performance. (Bug 13647945)
Support of Multiple Processor Groups

- Support a max of 4 processor groups with up to 64 CPUs in each group for a total of 256 logical CPUs (Support of 10 processor groups planned in a patchset)

- ORACLE_AFFINITY enhanced to enable affinity of Oracle threads to cpus in multiple processor groups
  - processorgroup is an optional parameter designating Windows CPU group. On systems with 64+ logical CPUs, Windows divides all available CPUs into 4 groups (0,1,2,3) with each group containing no more than 64 logical CPUs

Details in Oracle® Database Platform Guide 12c Release 1 (12.1) for Microsoft Windows
Program Agenda

- Windows Platform support
- Oracle Home User support
- Performance

**Security**
- Oracle RAC
- Microsoft Cluster Services support
- .NET Application Development
- Q&A
Windows Native Authentication (NTS)

- Enabled by default and can work across Windows systems
- Windows user logon credentials used for database authentication
- Windows Explorer or Oracle Administration Assistant can be used to manage user authentication and role authorization

Examples:
CONNECT / AS SYSDBA
CONNECT / AS SYSASM
Windows Native Authentication
SYSDBA and SYSOPER Privileges

- ORA_DBA
  - SYSDBA privileges for all Oracle Databases on the system
- ORA_OPER
  - SYSOPER privileges for all Oracle Databases on the system
- ORA_<HomeName>_DBA (12cR1)
  - SYSDBA privileges for Oracle Databases on a specific Oracle Home
- ORA_<HomeName>_OPER (12cR1)
  - SYSOPER privileges for Oracle Databases on a specific Oracle Home

All the groups are on the server system
Windows Native Authentication
Administrative Privileges for ASM Instance

- ORA_ASMADMIN (12cR1)
  - SYSASAM administration privileges on the computer
- ORA_ASMDBA (12cR1)
  - SYSDBA privileges for ASM Instance on the computer
- ORA_ASMOPER (12cR1)
  - SYSOPER privileges for ASM Instance on the computer

ORA_DBA and ORA_OPER group members no longer get privileges for ASM instance

All the groups are on the server system
Windows Native Authentication

Separation of Privileges

- ORA_<HomeName>_SYSBACKUP (12cR1)
  - Backup privileges (SYSBACKUP) for databases of a specific Oracle Home
- ORA_<HomeName>_SYSDG (12cR1)
  - Data Guard Privileges (SYSDG) for databases of a specific Oracle Home
- ORA_<HomeName>_SYSKM (12cR1)
  - Encryption Key Management privileges (SYSKM) for databases of a specific Oracle Home

All the groups are on the server system
Kerberos and ASM Enhancements

- Kerberos
  - Security enhancements that were introduced in the MIT Kerberos Release 1.8 distribution

- ASM file access control
  - Restrict access of database files to the owner of the database home
Program Agenda

• Windows Platform support
• Oracle Home User support
• Performance
• Security
• **Oracle RAC**
• Microsoft Cluster Services support
• .NET Application Development
• Q&A
Oracle RAC 12c provides:

1. Better Business Continuity and High Availability (HA)
2. Agility and Scalability
3. Cost-effective Workload Management
Program Agenda

- Windows Platform support
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Oracle Database 12c
Oracle Fail Safe Release 4.1

- Facilitates using an Oracle Database in a Microsoft Failover Clustering environment
- Included with all Oracle Database Server editions
- Microsoft Failover Clustering is included with Windows Server
An Oracle Database in a Failover Cluster

Basic Cluster Configuration

- Oracle homes are duplicated across all nodes in the cluster
- A hardware or software failure can trigger a failover to another physical node
Oracle Database 12c
Oracle Fail Safe Release 4.1

- New in this release
  - Database 12c support, including Oracle Home User
  - Integrated with Microsoft Management Console (MMC)
  - Compliant with Microsoft PowerShell scripting environment

- Software is available in Database CD pack or may be downloaded from Oracle Technology Network (OTN)

- See OTN for more information:
Program Agenda

• Windows Platform Support
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.NET Development – Oracle Database 12c
Major New Oracle .NET Features

- High availability and scalability in .NET
- Oracle Multitenant development in Visual Studio
- Oracle Schema Compare for Visual Studio
- ODP.NET, Managed Driver
High Availability and Scalability in .NET
High Availability and Scalability

- **Global Data Services**
  - Extend FCF, load balancing, and affinity capabilities to Data Guard and GoldenGate

- **Oracle Notification Service (ONS)** replaces AQ for Fast Application Notification (FAN)
  - Faster, more scalable, eliminates firewall issues, supports Active Data Guard, and consolidates publish/subscribe service
High Availability

- Faster and more graceful planned outages
  - DB brought offline as quickly as possible without end user disruptions

- Transaction Guard
  - Ensures transaction commits at most once

- Recoverable error detection and recovery
  - Determine with certainty whether can rollback or resubmit
Oracle Multitenant Development in Visual Studio
Multitenant Architecture

Components of a Multitenant Container Database (CDB)

Pluggable Databases (PDBs)
Multitenant for Test and Development

Clone production, plug into development. Clone/destroy test instances
Deployment

- Unplug from development/test environment
- Plug into production environment
Oracle Multitenant with ODAC 12c

- ODP.NET works implicitly with PDBs
  - Connect to the PDB service name
  - Hostname and port are same as container
- Requires Oracle Database 12c and ODAC 12c
MULTITENANT
Schema Compare Tool in Visual Studio

- New in Oracle Developer Tools for Visual Studio
  - ODAC 12c
  - Oracle Database 10.2 or higher

- Compare two schemas in the same or different DBs
  - Visually inspect differences using UI
  - Generate a diff script for deployment purposes
  - Reverse schema compare to “rollback” changes
  - Can compare down to granularity of schema type
    - e.g. compare all tables, or all packages, etc.
ODP.NET, Managed Driver
Current ODP.NET Architecture
Managed and Unmanaged

Managed
- ODP.NET Oracle.Data Access.dll

Unmanaged
- ODP.NET Unmanaged DLLs
- OCI
- NET

Database
- Oracle
Forthcoming ODP.NET Architecture

Fully Managed

**Managed**

ODP.NET
Oracle.Managed
DataAccess.dll

**Database**

Oracle
Managed ODP.NET vs. Unmanaged ODP.NET

Benefits

- One assembly for both 32-bit and x64
- Easier side by side deployment
- Deploy smaller and fewer binaries
  - Before: 150 MB
  - After: Less than 10 MB
- Easier patching process
- Fully integrated with Code Access Security
Managed ODP.NET Deployment Concepts

- Option 1: single configuration file deployment
  - .NET config file contains TNS, SQL*Net, and LDAP settings
    - i.e. Machine.config, web.config, app.config

- Option 2: multi-file configuration
  - .NET config file
    - Tnsnames.ora, sqlnet.ora, and ldap.ora

- Option 3: no configuration files
  - Store connect info in Data Source attribute
Unmanaged to Managed Migration

- Application migration process
  - 1. Use Oracle.ManagedDataAccess.dll reference in project
  - 2. Modify namespace(s) to Managed ODP.NET
  - 3. Change .NET config settings for Managed ODP.NET
    - Include *.ora file settings
- Managed ODP.NET APIs same as ODP.NET APIs
  - Initially, Managed ODP.NET does not support all ODP.NET features
  - Plan is eventual feature parity
For More Information

- Booth: Moscone South, Left - S-067 – Oracle Database on Windows
- Windows Server System Center
- Oracle .NET Developer Center
- Twitter - @OracleDOTNET
- YouTube - http://www.youtube.com/user/OracleDOTNETTeam
Questions & Answers