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What's New with Oracle Database 12c on Windows

On-Premises and in the Cloud

ORACLE OPEN WORLD

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San Francisco

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Server Technologies
September 21, 2016

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Program Agenda

1. Windows Platform Support
2. Oracle Database 12c Release 2
3. Cloud

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Windows Platform Support

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Windows Server 2016 and Windows 10

Supported Editions

- Windows Server 2016 editions
  - Datacenter, Essentials, and Standard Edition
- Windows 10 editions
  - Education, Enterprise, and Pro

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Database Certification on 32-bit Windows

OS	11.2 DB and client[1]	12.1 client[2]
Windows 7	Yes	Yes
Windows Server 2008	Yes	Yes
Windows Server 2008 R2	Yes	Yes
Windows 8	11.2.0.4	Yes
Windows 8.1	11.2.0.4	12.1.0.2
Windows Server 2012	11.2.0.4	Yes
Windows 10	No	12.1.0.2

#1

RAC 11.2 and higher does not support for 32-bit Windows

#2

For 12.1 and higher, only DB Client supports 32-bit Windows

Note: Oracle Database Client 12.2 and higher will only support Windows x64.

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Database Certification on 64-bit Windows

OS	11.2	12.1	12.2
Windows 7[1]	Yes	Yes	Yes
Windows Server 2008	Yes	Yes	No
Windows Server 2008 R2	Yes	Yes	No
Windows 8[1]	11.2.0.4	Yes	Yes
Windows 8.1[1]	11.2.0.4	12.1.0.2	Yes
Windows Server 2012	11.2.0.4	12.1.0.2	Yes
Windows Server 2012 R2	11.2.0.4	12.1.0.2	Yes
Windows 10[1]	No	12.1.0.2	Yes
Windows Server 2016	No	No	Yes[2]

#1

RAC and some server features not supported on Windows clients

#2

To be certified shortly post-release

Note: 32-bit Oracle Client is supported on Windows x64

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Database Certification on Windows Hyper-V

Guest OS	11.2	12.1	12.2
Windows Server 2008 R2	11.2.0.4 (SI only)	12.1.0.2 (SI only)	No
Windows Server 2012	11.2.0.4 (SI and RAC)	12.1.0.x (SI only)	12.2 (SI and RAC)
Windows Server 2012 R2 (Generation 1)	11.2.0.4 (SI and RAC)	12.1.0.2 (SI and RAC)	12.2 (SI and RAC)
Windows Server 2012 R2 (Generation 2)	No	12.1.0.2 (SI and RAC)	12.2 (SI and RAC)

- Host OS: Microsoft Hyper-V Server 2012 and 2012 R2 are certified
- Host OS: Microsoft Hyper-V Server 2016 will be certified

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Oracle Database 12c Release 2

Security

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Security

- Oracle Home User
- Windows Native Authentication
- Kerberos and ASM enhancements

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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

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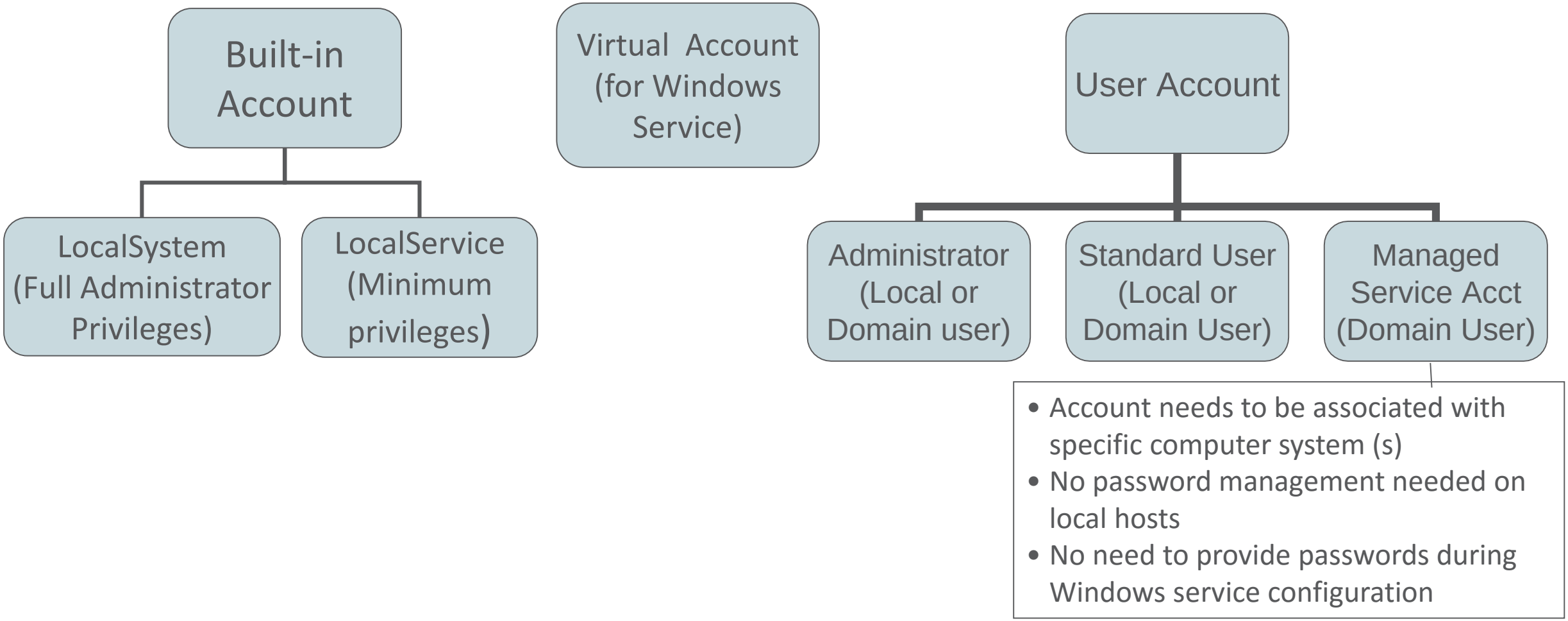
Microsoft Windows User Types Overview



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New Windows User Account Types Supported

NEW IN 12.2

- Virtual Account
  - Introduced by Microsoft in Windows 7 and Windows Server 2008 R2
  - Each Windows Service has it's own virtual account name
  - No password management
  - Can work in a workgroup or domain
  - Ability to access the network with a computer identity in a domain environment
- Group Managed Service Account (gMSA)
  - Introduced by Microsoft in Windows Server 2012
  - Single Group Managed Service Account (gMSA) can be used on multiple hosts
  - No password management needed on local hosts
  - No need to provide passwords during Windows service configuration

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Oracle Database Server Install

Oracle Database 12c Release 2 Installer - Step 5 of 10

Specify Oracle Home User

ORACLE DATABASE 12c

- Configure Security Updates
- Installation Option
- Database Installation Options
- Database Edition
- Oracle Home User
- Installation Location
- Prerequisite Checks
- Summary
- Install Product
- Finish

For enhanced security, you may choose to run Windows Services from this Oracle home with a non-administrator account. Oracle recommends that you choose a Virtual Account or specify a standard Windows User Account for this purpose.

- (●) Use Virtual Account
- ( ) 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

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Oracle Home User

- Different from Oracle Installation User who must have OS administration privileges
- Services for the Oracle Home run with this user name
- Can be Windows Built-in Account or Virtual Account or a standard Windows User Account
- Can not be changed post install
- 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)

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Oracle Home User Enhancements

Virtual Account Support

NEW IN 12.2

- New default for Single Instance Oracle Database Server install
- Only supported for Single Instance Oracle Database Server install
- No need to manage user name or password for Oracle Home User
- Database files are owned by the virtual account for the Oracle Database Windows Service (e.g. NT Service\OracleServiceORCL)
- Note: DB Client, built-in account option, uses LocalService and Service SIDs for client side Windows services, and is very similar to how Virtual Account works

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Oracle Home User Enhancements

Group Managed Service Account support

NEW IN 12.2

- Supported for all Oracle Database installs (DB Client, Single Instance Oracle Database, RAC and Grid Infrastructure)
- Works like any other domain user but no need to create Oracle wallet and/or provide password for any database operation

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Oracle RAC Database Install

Oracle Database 12c Release 2 Installer - Step 6 of 11

Specify Oracle Home User

ORACLE DATABASE 12c

- Configure Security Updates
- Installation Option
- Database Installation Options
- Nodes Selection
- Database Edition
- **Oracle Home User**
- Installation Location
- Prerequisite Checks
- Summary
- Install Product
- Finish

For enhanced security, you may choose to run Windows Services from this Oracle home with a non-administrator account. Oracle recommends that you choose a Virtual Account or specify a standard Windows User Account for this purpose.

- Use Virtual Account
- 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

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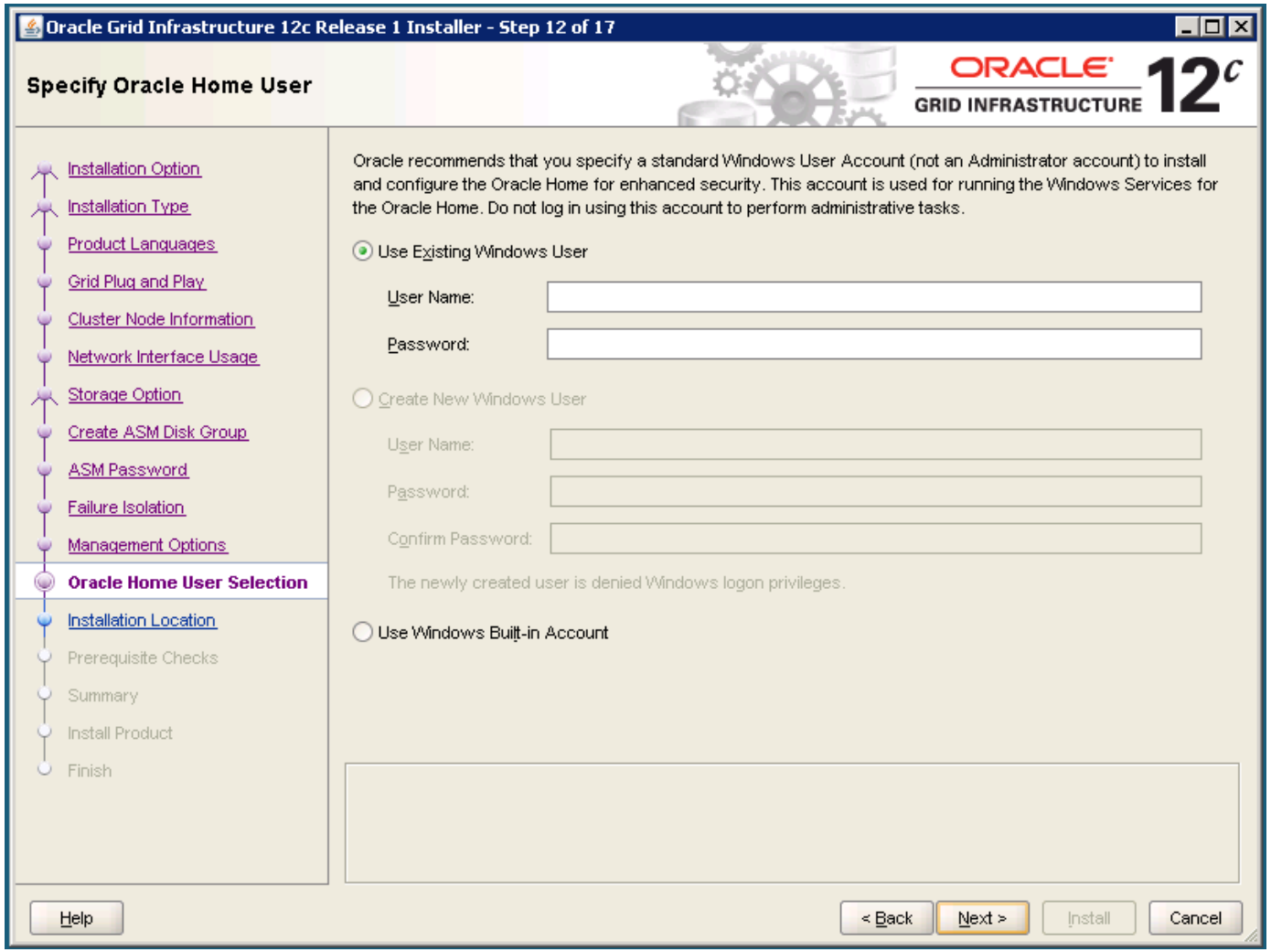
Oracle Grid Infrastructure Install



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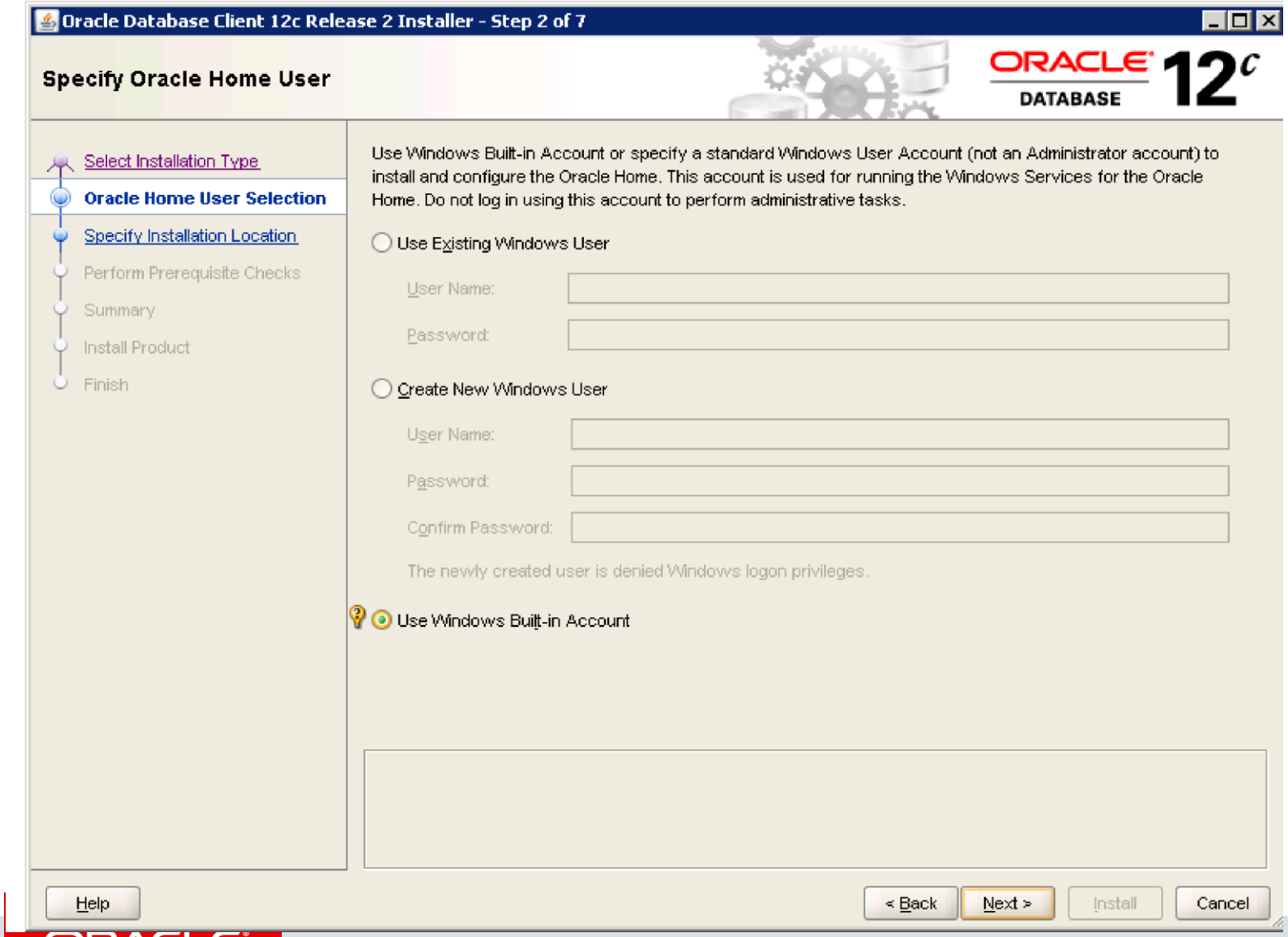
Database Client Install



- For Built-in Account option, Windows Services run under LocalService (not LocalSystem) for Database Client

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Install

Windows Account option for Oracle Home User	Needs to be pre-created?	Password needed during DB operations?	DB Server (SI)	DB Client	DB Server (RAC)	Grid Infra-structure
Virtual Account NEW IN 12.2	N	N	Y	N	N	N
Built-in Account (internally, use LocalSystem)	N	N	Y	N	Y	Y
Built-in Account (internally, use LocalService)[#2]	N	N	N	Y	N	N
Local User Account[#2]	N	Y	Y[#1]	Y	N	N
Managed Services Account	Y	N	Y	Y	N	N
Group Managed Services Account NEW IN 12.2	Y	N	Y	Y	Y	Y
Domain Account	Y	Y	Y	Y	Y	Y

[#1] – Windows OS authentication can not be used across systems

[#2] – Windows Services can not access any secure shared network resource using its own Windows identity

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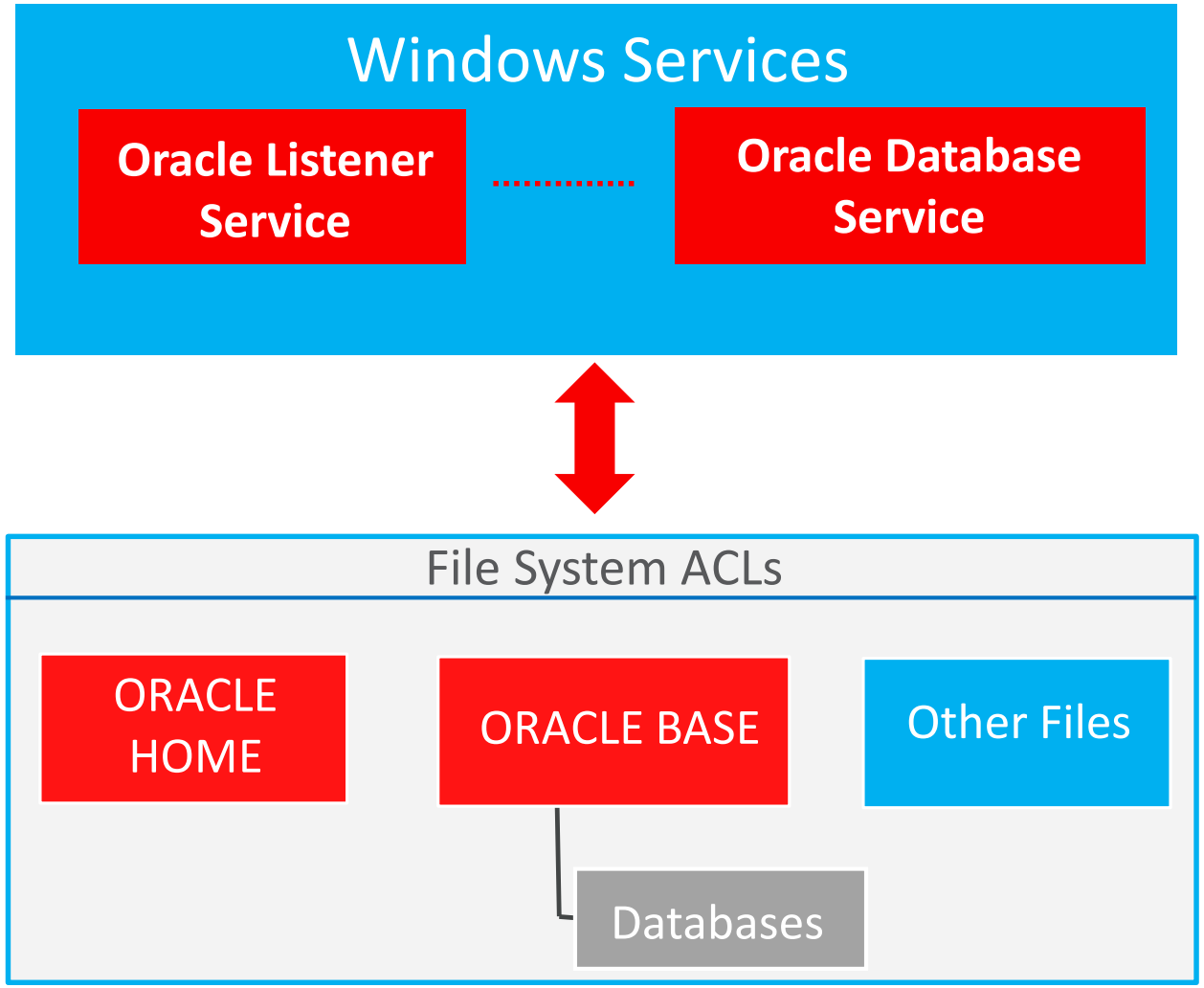
Oracle Database Services on Windows



- 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)
- Either user name or Service SID can be used to grant privileges or set ACLs for file system access
- 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

Please check *Oracle Database Platform Guide for Microsoft Windows* for more information.

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Database Creation

- Database Configuration Assistant (DBCA) is used to create or modify Oracle Database 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 Configuration Assistant* (the icon is set up to "run as administrator") to invoke DBCA
- 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 is 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

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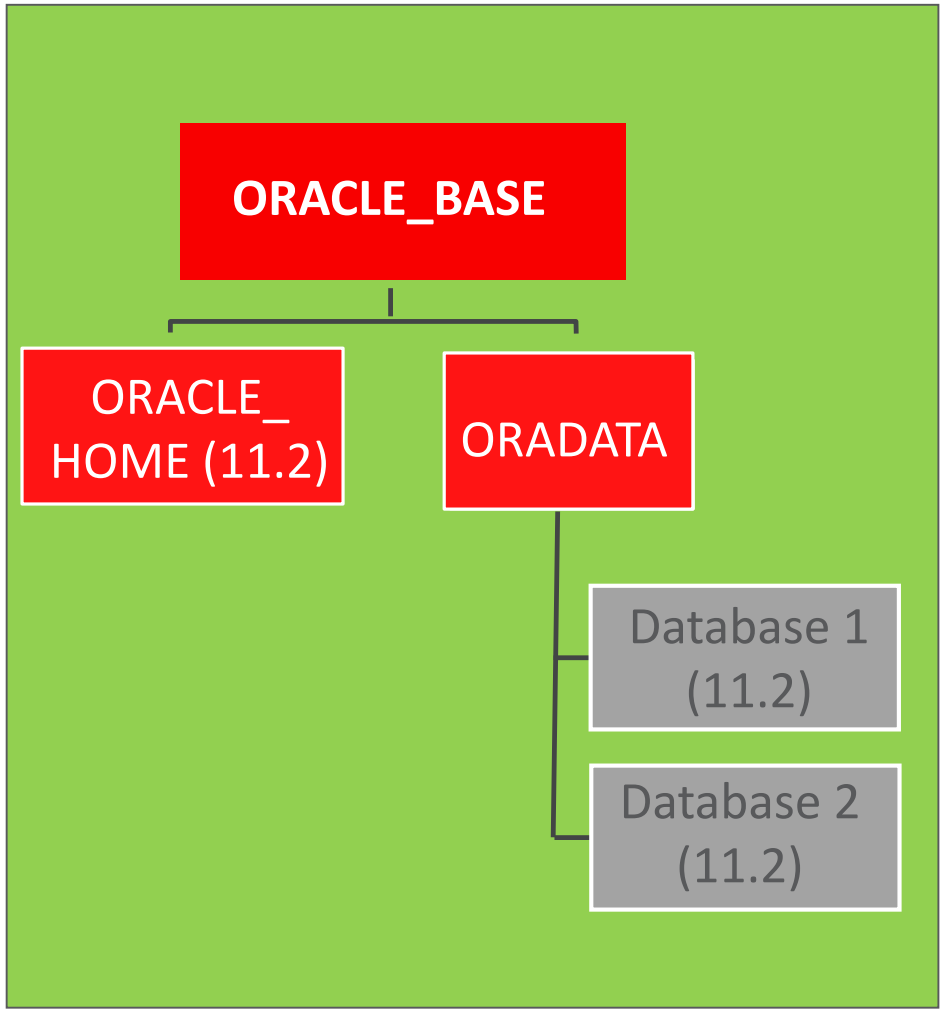
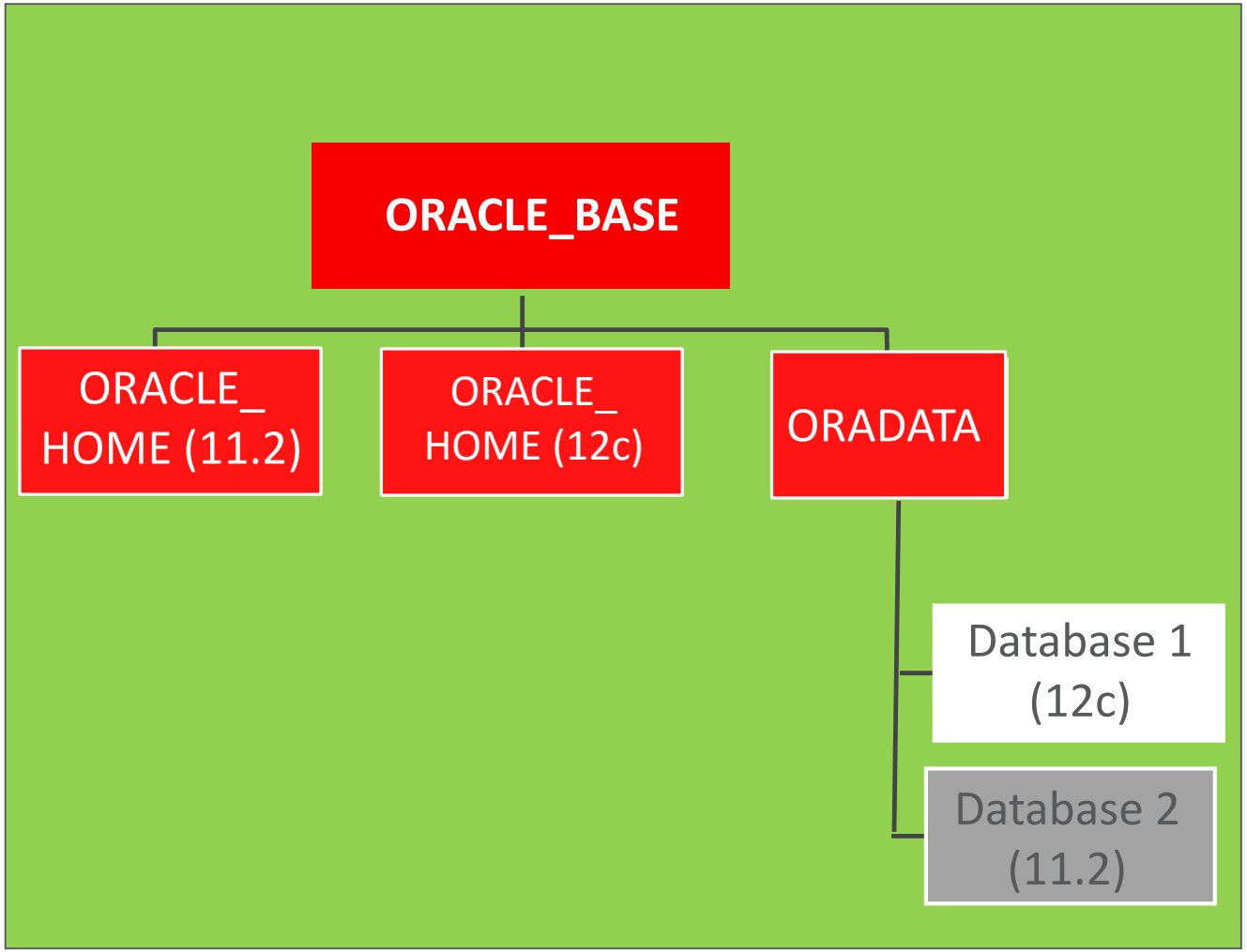
Oracle Database Upgrade





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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* (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)

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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

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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 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)

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Recommendations for Oracle Home User

- For DB server (SI)
  - Use Virtual Account to avoid password management (12.2)
  - For 12.1, specify a Windows user account during install
- For RAC DB and Grid Infrastructure install
  - Use a domain user or group managed service account
  - For a group managed service account (12.2), you do not need to provide the password for any database operation
- If you want to separate out administration domains (e.g. Production and Test databases) of different Oracle Homes for security reasons:
  - Use Virtual Account and specify distinct Oracle Base directory for each administration domain
  - Use distinct Oracle Home User account (and Oracle Base directory) for each administration domain
- For DB client install, use Built-in Account option

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Security

- Oracle Home User
- Windows Native Authentication
- Kerberos and ASM enhancements

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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
- Works for Pluggable Databases
- New client-side parameter in sqlnet.ora:
  - "no_ntlm“, which may be set to true for security reasons. (Only works for domain users)
  - Examples: CONNECT / AS SYSDBA or CONNECT /

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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

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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

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Windows Native Authentication

Administrative Privileges for ASM Instance

- ORA_ASMADMIN (12cR1)
  - SYSASM 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

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Security

- Oracle Home User
- Windows Native Authentication
- Kerberos and ASM enhancements

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Kerberos and ASM Enhancements

- Kerberos
  - Security enhancements that were introduced in the MIT Kerberos Release 1.8 distribution
  - In sqlnet.ora, set SQLNET.KERBEROS5_CC_NAME = MSLSA: (instead of OSMSFT:)
- ASM file access control
  - Restrict access of database files to the owner of the database home

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Oracle Database 12c Release 2

Scalability and Performance

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Large Pages

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

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Large Pages

- 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

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Multiple Processor Groups

- Support max of 10 processor groups with up to 64 CPUs in each group in 12.1.0.2 (12.1.0.1 supports 4 processor groups)
- *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 for Microsoft Windows

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DNFS Client and Resilient File System

NEW IN 12.2

- Database 12c DNFS client
  - Standard NFS path formats allow user to utilize standard URN notation for NFS in oranfstab config file and while working with oradnfs utility
    - e.g. “nfs://server/share/file”
- Windows Resilient File System support

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Oracle Database 12c Release 2

Ease of Management and Development

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Oracle Database Instance Manager Available as Microsoft Management Console Snap-In

NEW IN 12.2

ORADIM as an MMC Snap-In

- ORADIM performs DB create, edit, delete, start, and shutdown operations
- All ORADIM operations available in snap-in
- Benefits
  - Centralized instance management for all Oracle Database Homes
  - Familiar Windows GUI management tool
- Found in path ORACLE_HOME\MMC Snap-Ins\oradim or click on ORADIM shortcut in Oracle Home

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.NET Development

ODAC

NEW IN 12.2

- DB Client 12.2
  - Application Continuity
  - Sharding
- ODAC 12.2
  - Connection pool tagging
  - ODP.NET Database Resident Connection Pooling (DRCP)
  - Oracle Multitenant improvements
  - Oracle Edition-Based Redefinition improvements
  - Offline Schema Compare in Visual Studio

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Cloud

Windows and .NET

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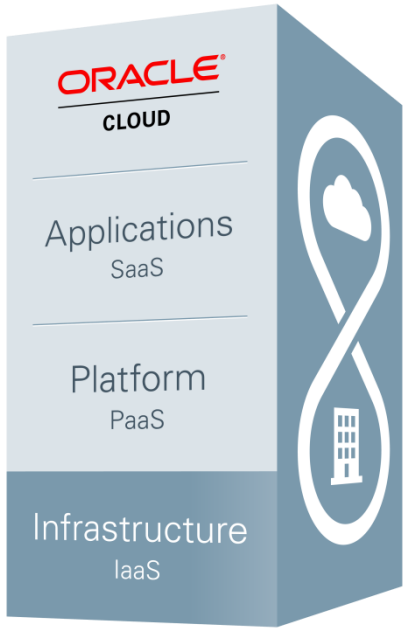
Oracle Compute Cloud Service

Deploy .NET applications to Oracle IaaS on Windows

- Windows 2012 R2 and Windows 2008 R2 VMs available from Oracle Cloud Marketplace to
  - Free during promotional period
  - Deploy to Oracle Compute
- Deploy and configure IIS, .NET, and ODP.NET apps to Oracle Compute
  - How To White Paper: Deploying Microsoft Web Application Server on Oracle Compute Cloud Service



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Easy On-Ramp to Oracle Database Cloud Services

	Exadata **Express**	Full-Instance **Enterprise**	Dedicated **Exadata**
Development & Test	✓	✓	✓
SMB, Departmental Applications	✓	✓	✓
Enterprise Applications		✓	✓
Highest Availability, Scalability, Performance			✓

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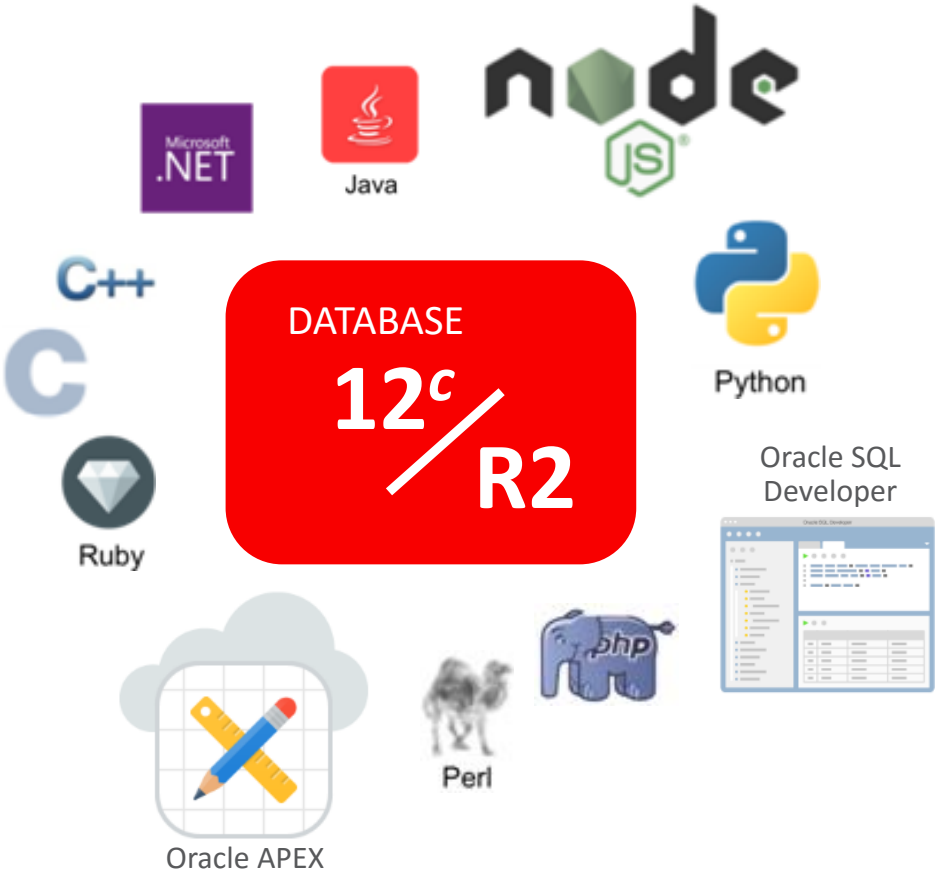
The Best Cloud Database for Windows Developers

- Popular language drivers
  - ODP.NET
- Multiple interfaces
  - Full Oracle Net (SQL*Net)
  - REST API, JSON storage
- Updated tools
  - Oracle Developer Tools for VS
  - SQL Developer, Data Modeler
  - Powerful new command-line



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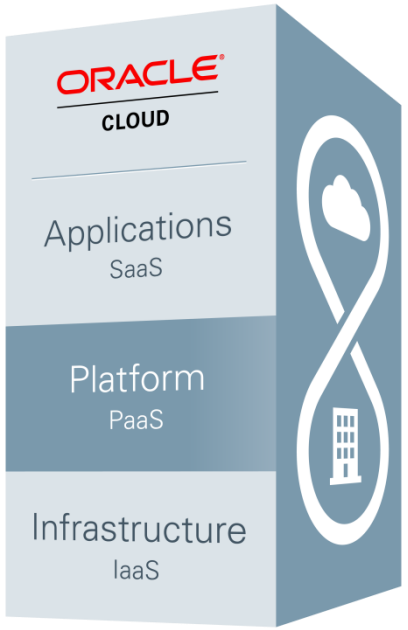
Oracle Database Exadata Express Cloud Service

Connect from On-premises

- Use ODP.NET and ODT 12.1 for Oracle Public Cloud or higher
  - ODT for VS 2015 and VS 2013
  - Managed and unmanaged ODP.NET
- How to connect:
  - Developing .NET Applications for Oracle Database Exadata Express Cloud Service
  - Uses Oracle Net Services with Oracle Wallet to secure connection



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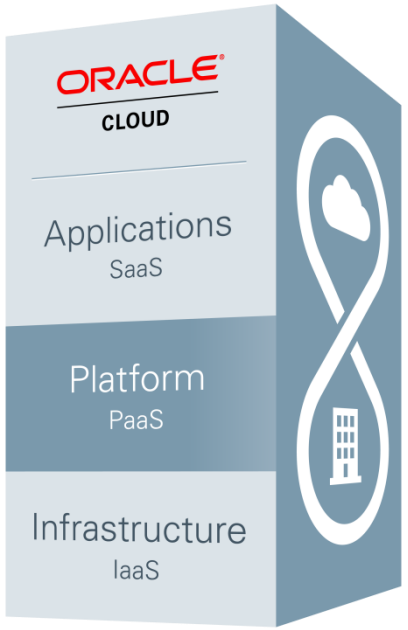
Oracle Database Cloud Service (non-Exadata Express)

Connect from On-premises

- Use ODP.NET and ODT 12.1 for Oracle Public Cloud or higher
  - ODT for VS 2015 and VS 2013
  - Managed and unmanaged ODP.NET
- How to connect:
  - Developing .NET Applications for Oracle Database as a Service
  - Secure Shell (SSH) required to secure connection
    - Use SSH client to create tunnel, such as PuTTY
    - PuTTY can also generate private and public SSH key pair



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Q&A

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Integrated Cloud

Applications & Platform Services

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