Oracle® Virtual Desktop Infrastructure

Administration Guide for Version 3.2

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Oracle Virtual Desktop Infrastructure 3.2 Administration Guide

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Desktop Provider Management (All Topics)

About Generic Desktop Providers

One of the benefits of desktop virtualization solution like Oracle VDI is that companies can slowly make a transition from their traditional infrastructure to a virtualized one. In some cases, it may make sense to build a VDI setup top-down instead of bottom-up. The Generic Desktop Provider feature was created for just this purpose.

The Generic desktop provider can act as a desktop provider to any virtual or physical machine with an RDP connection. This enables you import and manage individual Windows PCs with the Oracle VDI Manager.

See How to Import Individual Windows PCs for detailed instructions.

About Clone and Recycle Job Management

The cloning and recycling of desktops can be a resource intensive processes. For this reason, Oracle Virtual Desktop Infrastructure enables you to limit the number of clone and recycle jobs that can run in your VDI environment at any one time.

Setting Peak Times for Desktop Providers

At the desktop provider level, the Oracle VDI Manager enables you to specify the maximum number of cloning and recycling jobs that will run at peak and off-peak times. You can also configure the times during each day that are considered peak times. Once set, Oracle VDI will control the combined total number of clone and recycle jobs that it runs according to the limits that are set.

To set the peak times information, select a desktop provider's profile in the Desktop Providers category and click on the Peak Times tab.

Setting Cloning Production Priorities for Pools

At the pool level, the Oracle VDI Manager enables you to specify the cloning production priority for particular pools. This priority is assigned to the pool when clone jobs are being submitted. A pool with a high production priority is allowed to clone more quickly than a pool with medium priority, and a pool with medium priority is allowed to clone more quickly than a pool with low priority. The production priority setting does not apply to recycle jobs.

To set the cloning production priority for pools, select an existing pool in the Pool category and click on the Cloning tab.

About Desktop Provider Alarms

The Oracle VDI Manager provides a status of the desktop provider alarms in the application's masthead, below the Log Out and Help buttons. If there are no current desktop provider alarms in the Oracle VDI environment, the Alarms heading does not display.

The icons next to the Alarms heading change depending on the status of the desktop providers in the VDI environment. For each alarm state displayed, a counter specifies how many desktop providers are currently in that state. The valid states include:

- Major Alarm - An alarm condition occurred that is currently impairing service but not seriously. The condition needs to be corrected before it becomes more severe. A major alarm is represented by a yellow icon.
- Critical Alarm - An alarm condition occurred that is seriously impairing service and requires immediate correction. The critical alarm is represented by a red icon.

Each alarm counter is also a link that displays the Desktop Providers page based on the following conditions:

- If you click on the Major alarms link, the Desktop Providers page is displayed and lists the desktop providers that currently have major or critical alarms.
- If you click on the Critical alarms link, the Desktop Providers page is displayed and lists the desktop providers that currently have critical alarms.

How to Create Desktop Providers

Desktop providers encapsulate the details of the underlying virtualization platform. At a minimum, you must configure one desktop provider before you can continue with the creation of pools. There is no limitation to the number of providers the system can manage. At any time, you can configure additional providers.

Desktop providers can also be configured to run a specified number of synchronous desktop cloning and recycling jobs during and outside of specified peak hours. To specify peak times, go to the Peak Times tab of the desktop provider's profile.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Select the Desktop Providers category, and click New in the Desktop Providers table.
   This will activate the New Desktop Provider wizard that enables you to add multiple hosts and multiple storages in a loop.
3. The New Desktop Provider wizard will require different information depending on the virtualization platform in use. For instance, all desktop providers require a host IP address and administrator credentials. Oracle VDI or Microsoft Hyper-V desktop providers require a host and a storage.
4. Once you click Finish, the new desktop provider will appear in the Oracle VDI Manager.

- Oracle VDI and Microsoft Hyper-V desktop providers - You can now view the details, including CPU and memory use. It is also possible to add or remove additional host or storages as needed.
  For Microsoft Hyper-V desktop providers, you should also check the Network tab of the desktop provider to verify that the virtual network you created on your Microsoft Hyper-V machine has been detected correctly.
- VMware vCenter desktop providers
  You can now view the VMware vCenter resource details, including datacenters, VMware clusters, and datastores.
- Microsoft Remote Desktop providers
  You can now view the provider details, including CPU and memory use. It is possible to add or remove additional Microsoft Remote Desktop Services hosts as needed, provided they all belong to the same cluster.
- Generic desktop providers
  Refer to the How to Import Individual Windows PCs for information about importing individual Windows PCs.

How to Create Automated Administration Scripts

The `/opt/SUNWvda/sbin/vda` CLI can be used in scripts for automated administration.

Reading the Return Code

The `/opt/SUNWvda/sbin/vda` returns the following exit codes:

- 0: Successful completion
- 1: An error occurred
- 2: Invalid command line options or arguments were specified

Waiting for a Job to Finish

Some `vda` subcommands return immediately but start an action in the background, a job.
The subcommand `job-wait` allows to synchronously wait for a specific job to be completed.

```
# /opt/SUNWvda/sbin/vda job-wait --help
Wait until the job ends

Usage:
 vda job-wait [-t <timeout> | --timeout=<timeout>] <job>
 -?, --help               Print this help list
Options:
 -t <timeout>, --timeout=<timeout>
                          Timeout in seconds to wait
Operand:
*<job>                    The id of the job
'*' denotes mandatory parameters.
```

Parsing the Output of the CLI

A number of subcommands support a parseable option so that the output is formatted for easy parsing: as a list of lines of colon-separated (':') fields.

The syntax of the option is:

```
 -x, --parseable         Display output suitable for programmatic parsing.
```

user-search

Search for users/groups in the user directory that match the specified search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Name of the user/group	string
Kind of object	`User` / `Group`
DN of the user/group	string

user-show

Show the desktops available for the user.

Parseable Output in the case of a user: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token <token>` / `Group <group_name>` / `Custom Group <group_name>`

Parseable Output in the case of a group: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

user-desktops

Show the desktops assigned to the user.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

group-list

Lists all custom groups.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Custom Group Name	string

group-show

Show the pools assigned to the custom group.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format

Pool Name	string

token-search

Search for tokens that match the search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Token	string
Name of the Associated User	string
DN of the Associated User	string

token-show

Show the desktops available for the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token` / `Group <group_name>` / `Custom Group <group_name>`

token-desktops

Show the desktops assigned to the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

pool-list

List all pools.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Type of Desktop Assignment	`Personal` / `Flexible`
Number of Desktops	integer
Desktop Provider Name	string

pool-show

Show detailed information about the pool.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Assignment Status	`Enabled` / `Disabled`
Type of Desktop Assignment	`Personal` / `Flexible`
Desktop Provider Name	string
Cloning Status	`Enabled` / `Disabled`
Template	`None` / string
Number of Cloning Jobs	integer
Number of Available Desktops	integer
Number of Assigned Desktops	integer
Total Number of Desktops	integer
Guest Pool	`Enabled` / `Disabled`

pool-desktops

List all desktops from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Unknown`
Desktop State	`Available` / `Used` / `Idle` / `Unresponsive` / `Reserved` / etc.
DN of Assigned User	string

pool-templates

List all templates from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Aborted` / `Unknown`
Master Revision	string
Cloned Desktops	string

template-revisions

List the revisions of the template.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Revision Name	string
Revision ID	long
Creation Date	timestamp
Is It Master	`yes` / `no`
Cloned Desktops	string

provider-list

List all desktop providers.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Provider Name	string
Provider Type	`Sun VirtualBox` / `VMware vCenter` / `Microsoft Hyper-V` / `Microsoft Remote Desktop`
Total Number of Desktops	integer
Number of Used Desktops	integer
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Storage Usage	`xx% (x.x GB/MB)`

provider-list-hosts

List all hosts for the VirtualBox desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Status	`OK` / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Number of Desktops	integer

provider-list-storage

List all storage servers for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string

Status	OK / Unresponsive / etc.
Enabled	Enabled / Disabled
ZFS Pool	string
Capacity	xxx.x GB
Usage	xx.x GB
Number of Desktops	integer

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Storage ID	string
ZFS Pool	string
Capacity	xxx.x GB
Usage	xx.x GB
Number of Desktops	integer

provider-list-templates

List the templates for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	string
Path	string

provider-list-unmanaged

List the desktops from the virtualization platform that are not managed by any desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Desktop Name	string
Desktop ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format

Desktop Name	string
Desktop ID	string

provider-list-networks

List all networks for the desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Subnet Label	String
Subnet Address	String
Availability	`All Hosts` / `Not on: <comma_separated_list_of_hosts>`

job-list

List the existing jobs.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
ID of the Job	integer
Cancellable	'C' if the job can be cancelled

job-show

Show the job details.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
Start Time	hh:mm:ss
End Time	hh:mm:ss
Job Details	string
Cancellable	`true` / `false`

How to Delete Orphan Disks

For the Oracle VDI Hypervisor and Microsoft Hyper-V desktop providers, storage is provided by external storage volumes, and this storage is assigned to desktops and templates as you create them. Eventually, you may delete the desktop and templates, but the associated storage is not automatically released.

Orphan disks are those storage volumes that are not currently mapped to any desktop or template and can be deleted to free up space. Orphan disks that have descending clones cannot be deleted.

Some orphan disks may still hold important data. Make sure the data on an orphan disk is no longer needed before you delete it.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Select an existing Oracle VDI or Microsoft Hyper-V desktop provider in the Desktop Provider Category.
3. Click the Storage tab.
4. Select a storage server.

   The Storage Summary page is displayed for the storage server.
5. Click the Orphan Disk subtab.

   The Orphan Disk page is displayed.
6. Select the orphan disks to delete and click Delete.

The orphan disks without a checkbox cannot be deleted.

CLI Steps

1. List the current desktop providers.

```
# /opt/SUNWvda/sbin/vda provider-list
```

2. List the storage servers for the specific desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-list-storage <desktop-provider>
```

3. List the orphan disks for a desktop provider's storage server.

```
# /opt/SUNWvda/sbin/vda provider-storage-orphans -h <storage-hostname> -z
<storage-zfs-pool> <desktop-provider>
```

4. Delete one or more orphan disks.

```
# /opt/SUNWvda/sbin/vda provider-storage-orphan-delete -r <desktop-provider> -s
<storage-hostname> -z <storage-zfs-pool> <volumeId1>[ <volumeId2>...]
```

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Desktop Pool Management (All Topics)

About Per Pool Network Configuration

The Per Pool Network Configuration feature enables an administrator to specify the subnet in which desktops will be placed. For Oracle VDI, Microsoft Hyper-V, and VMware vCenter desktop providers, Oracle Virtual Desktop Infrastructure will detect the networks that are configured on the provider's hosts, and the administrator can select which of these networks should be used in specific pools.

Configuration of networks is done at two levels in VDI:

- Desktop Provider (Oracle VDI and Microsoft Hyper-V only) - Each subnet available on either an Oracle VDI Hypervisor or Microsoft Hyper-V host is identified by a unique label. By default this label is the subnet address, but it can be changed in the Network tab for the desktop provider. When a host is added to a desktop provider, VDI will detect the subnets available on that host and will update the Network table accordingly. If a subnet is not available on any of the hosts in a provider, VDI will display a warning. You can view the list of subnets available for a specific host by selecting that host in the Host tab for the desktop provider. If you make changes to the networking on a host, click the Refresh button in the Network tab so that VDI can rescan the subnets available on the host.

- Desktop Pool
    - Oracle VDI and Microsoft Hyper-V desktop providers only - A pool can have one or more networks assigned to it. When a pool is created, VDI will check whether any networks are available on all hosts for the desktop provider of the pool, and it will assign one of these networks to the pool. If no networks are available on all hosts for the provider, the administrator must explicitly specify a network to be used by the pool through the Settings tab for the pool. When desktops are imported or cloned in a pool, VDI will create a network device on the desktop and configure that device to be in the networks that have been enabled for the pool. If more than one network has been configured for the pool, VDI will use the network that has been configured as the primary network when trying to establish an RDP connection to the desktop. The primary network for a pool can be configured in the Settings tab.
    - VMware vCenter desktop provider only - The default behavior for VMware vCenter pools is to use the network configuration stored with your VMware vCenter templates and virtual machines. You can override this behavior for a given pool by enabling the use customized network settings in the pool's Settings tab.

The Per Pool Network Configuration feature is only available for Oracle VDI desktop provider pools if Host Networking is being used.

About Personal Hard Drives

Oracle Virtual Desktop Infrastructure 3.2 software includes many features to simplify the provisioning of user desktops. This includes automatic cloning and recycling of old desktops, flexible and personal assignments, and now includes in-line template management (revisions). Using these features, an administrator can destroy a user's old desktop and clones a fresh one in its place. While this process is straight-forward and saves time, it has one serious deficiency – the user's local data is destroyed each time the desktop is updated from a newer revision.

Enabling the Personal Hard Drive feature provisions a second data disk to each desktop, a drive 'D:'. The user's profile directory, including all information stored under `C:\Documents and Settings\<UserName>`, is redirected to this second 'personal hard drive'. When an administrator updates the desktop revision or template, the desktop's primary disk, containing the OS, is replaced with a clone of the new revision. During this process, the users personal hard drive is preserved and re-attached to the new clone leaving all profile settings and personal data intact. Personal hard drives should be used when users have personal information stored on their desktop which should be persistent throughout template/revision updates.

Personal hard drives can only be used on desktops in personal pools with an Active Directory connection (LDAP, Kerberos, or Public Key) using either Sysprep or FastPrep. To enable the Personal Hard Drive feature, go to the Cloning tab of a pool's profile in the Oracle VDI Manager. A pop-up window will allow you to enable the feature and set the size of the personal hard disk. Only desktops cloned after the feature has been enabled will have the second disk. Existing desktops will not be affected. Updating the master revision of a template used by a personal pool will result in all available desktops being recycled and replaced with the new clones. Any assigned and idle desktops will be refreshed with the new revision but retain the assignment and personal hard drive.

About Clone and Recycle Job Management

The cloning and recycling of desktops can be a resource intensive processes. For this reason, Oracle Virtual Desktop Infrastructure enables you to limit the number of clone and recycle jobs that can run in your VDI environment at any one time.

Setting Peak Times for Desktop Providers

At the desktop provider level, the Oracle VDI Manager enables you to specify the maximum number of cloning and recycling jobs that will run at peak and off-peak times. You can also configure the times during each day that are considered peak times. Once set, Oracle VDI will control the combined total number of clone and recycle jobs that it runs according to the limits that are set.

To set the peak times information, select a desktop provider's profile in the Desktop Providers category and click on the Peak Times tab.

Setting Cloning Production Priorities for Pools

At the pool level, the Oracle VDI Manager enables you to specify the cloning production priority for particular pools. This priority is assigned to the pool when clone jobs are being submitted. A pool with a high production priority is allowed to clone more quickly than a pool with medium priority, and a pool with medium priority is allowed to clone more quickly than a pool with low priority. The production priority setting does not apply to recycle jobs.

To set the cloning production priority for pools, select an existing pool in the Pool category and click on the Cloning tab.

How to Create Desktop Pools

Oracle Virtual Desktop Infrastructure organizes desktops in pools. A pool is a collection (or container) of desktops. Typically you will create different pools for different types of users. For example, the engineering team in your company might have different desktop requirements than the marketing department.

Oracle VDI Desktop Providers Only
When changing pool settings from NAT networking to Host Networking + Windows RDP, existing desktops that are running must be stopped and restarted or else subsequent user requests for these desktops will fail.
This issue occurs because existing, running desktops will be using NAT and will not have a public IP address. After the pools settings have been changed, subsequent requests for that desktop will attempt to access the desktop via the private (and unaccessible) NAT IP.

Microsoft Remote Desktop Providers Only
Only one pool can be created per Microsoft Remote Desktop provider.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Select a Company in the Pools category.

3. Click New in the Pools table.
   A New Pool wizard is displayed.

   a. For Oracle VDI and Microsoft Hyper-V desktop providers, choose one of the following pool types:
      - Dynamic pools are filled with cloned flexible desktops. If you choose the Dynamic Pool type, the desktops in the pool will be temporarily assigned to users. They will be recycled each time the user logs out. This pool type is considered dynamic because the user-desktop assignments are often changing.
      - Growing pools are filled with cloned personal desktops. If you choose the Growing Pool type, the desktops in the pool will be permanently assigned to users. Users can log in and out without losing their desktop settings. The desktops are not recycled.
      - Manual pools are initially empty. They are filled manually by importing personal desktops. The Manual Pool type should be used if cloned desktop assignment is not an option.

      For Microsoft Remote Desktop providers, pool types do not apply.

How to Enable Oracle VDI Fast Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)

Windows desktops require customization for successful cloning by the Oracle VDI Core. Unlike Microsoft System Preparation, Fast Preparation (FastPrep) doesn't require any special preparation of the template prior to use.

Before You Begin

1. Prepare the template for Fast Preparation.
   a. If a post-customization script is required, the script should be copied to the template prior to cloning.
   b. Ensure that the template is not a member of a domain, it must be a member of a workgroup.

2. Import a virtual machine template in the Oracle VDI Manager.
   For more information, refer to one of the following pages:
   - How to Import Desktops (Sun VirtualBox)
   - How to Import Desktops (Microsoft Hyper-V)

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Prepare a pool to clone customized desktops based on Fast Preparation.
   a. Go to a pool's Cloning tab, or the Select Template screen of the New Pool wizard.
   b. Click Create next to System Preparation.
   c. Select the appropriate Fast Preparation option from the drop down for your template OS.
   d. The Create System Preparation File dialog will appear.
      - Windows Domain - The FQDN of the Windows domain. e.g. my.domain.com
      - Domain Administrator - A domain administrator with permission to create a computer account and join the domain. This can optionally be prefixed with the domain, e.g. my.domain.com\Administrator
      - Domain Administrator Password - The password the for the domain administrator
      - Computer Container DN - The DN to place the new computer account in (e.g. OU=Accounting,OU=VDICenter,DC=my,DC=domain,DC=com). If left blank the default Computers container is used (ou=Computers,DC=my,DC=domain,DC=com).

- Read-only Domain Controller - From Windows 2008 Server, domain controllers (DC) can be configured as read-only for deployments in unsecured locations. For a computer to join a domain via a read-only DC the account must already exist and a special read-only flag is needed.
- Desktop Administrator - An administrator account on the template that has permissions to change the computer name, join a domain and optionally execute the custom script. For Windows Vista/7 the 'Administrator' account must be enabled and used.
- Desktop Administrator Password - The desktop administrator password
- Custom Script - An optional script that will be executed after customization has completed. This script can be a batch file or executable and must be located in a drive or folder accessible by the template and clones.

You are now ready to clone customized Windows desktops. Refer to the How to Clone Desktops (Sun VirtualBox) and How to Clone Desktops (Microsoft Hyper-V) pages.

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

2. Prepare a pool for sysprepped cloning.

```
# /opt/SUNWvda/sbin/vda pool-create-fastprep -p domain=<domain
FQDN>,domain-admin=<Domain Administrator>,domain-password=<Domain Administrator
Password>,admin=<Desktop Administrator>,admin-password=<Desktop Administrator
Password>,windows-release=<winxp or win7> -u <User Directory ID> <pool name>
```

How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)

Windows desktops require System Preparation for successful cloning by the Oracle VDI Core. After you create a Windows virtual machine, you should prepare it for Sysprep by downloading a Sysprep CAB (Windows XP only), and installing the Oracle VDI Tools (Hyper-V virtualization platforms only). Import the virtual machine into the Oracle VDI Core as a template, and select System Preparation on one of the template revisions. The Oracle VDI Core boots the revision, runs `Sysprep.exe`, and then shuts down the system. The revision now acts as a blank slate for cloning desktops in any pool with a valid System Preparation file.

A pool's System Preparation file defines licensing and credentials. If a pool has a valid System Preparation file, System Preparation is enabled, and cloning from the sysprepped template is enabled, all cloned desktops in the pool will have the customization defined by the System Preparation file.

One sysprepped revision can be used for multiple pools, and the System Preparation files can be changed and saved at any time from within the Oracle VDI Manager.

Due to a bug in Windows 7, the Windows Media Player Network Sharing Service causes the Windows Sysprep tool to hang. If you do not need this service enabled in your Windows 7 desktops and you intend to run System Preparation from the Oracle VDI Manager, stop and disable it. If you prefer to leave this service enabled, run Sysprep manually from within the template's Run console before importing it.

```
sysprep.exe -generalize -oobe -shutdown -quiet
```

Before You Begin

1. (Hyper-V Only) Install the Oracle VDI Tools on the template.
   The System Preparation action in the Template tab will not work if you do not have the tools (`vda-tools-x86.msi` for 32-bit platforms or `vda-tools-x64.msi` for 64-bit platforms) installed on your template. For Windows XP templates, you also need to have the Sysprep tools in a `C:\Sysprep` directory.

2. Prepare the template for System Preparation.
    - Windows 2000 and Windows XP
        a. Log into the template and download the appropriate Sysprep CAB for your version of Windows XP.
            - Windows 2000 Service Pack 4 Deployment Tools
            - Windows XP Service Pack 2 Deployment Tools
            - Windows XP Service Pack 3 Deployment Tools
        b. Create a directory on the template named `C:\Sysprep`.
        c. Unpack the contents of the Sysprep CAB into the `C:\Sysprep` directory.
    - Windows Vista and Windows 7
      No files need to be installed. Windows Vista and Windows 7 ship with all required system preparation files pre-installed.

3. Import a virtual machine template in the Oracle VDI Manager.
   For more information, refer to one of the following pages:
    - How to Import Desktops (Sun VirtualBox)
    - How to Import Desktops (Microsoft Hyper-V)

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Run System Preparation in a template revision.
    a. Click the Template tab, and select a revision.
    b. Choose System Preparation from the More Actions menu.
       This action will start a job, start the revision, run `Sysprep.exe`, and wait for the system to shut down.
    c. Wait for the job to complete successfully via the Job Summary pop-up. If the job fails for any reason, details of the failure can viewed in the Job Details text area by clicking on the failed job.
    d. Select the sysprepped revision and click Make Master.
       All pools currently using this template will clone new desktops from the sysprepped revision.

3. Prepare a pool to clone customized desktops based on a System Preparation file.
    a. Go to a pool's Cloning tab, or the Select Template screen of the New Pool wizard.
    b. Create a System Preparation file.
       The file requires a Windows administrator password, a Windows license key, and a Windows workgroup or a Windows domain, domain administrator, and administrator password.
    c. Select the sysprepped template, and select Apply System Preparation.
       You are now ready to clone customized Windows desktops. Refer to the How to Clone Desktops (Sun VirtualBox) and How to Clone Desktops (Microsoft Hyper-V) pages.

How to Configure Networks Per Pool

For Oracle VDI, Microsoft Hyper-V, and VMware vCenter pools, you can select which network desktops imported or created in the pool will use. For more detailed information, see About Per Pool Network Configuration.

VDI Manager Steps

1. Sign into the VDI Manager.
    a. Go to http://<server name>:1800 (or http://localhost:1800 if remote administration has been disabled), and use root user credentials. For a multi-host configuration, use one of the VDI Secondary hosts.
    b. You will be re-directed to https and the browser will ask you to accept the security certificate. After confirmation, you should get the login screen.

2. Select the Pools category, and click an existing pool.

3. Click the Settings tab to specify which networks are configured on the desktops in the pool.
   For each network selected, a network adapter will be created on new desktops created in that pool.

Oracle VDI and Hyper-V desktop provider notes:

- Rename or refresh the desktop provider network list - Select the Desktop Providers category, and select the Oracle VDI or Microsoft Hyper-V desktop provider of interest. Select the Network tab to see the network(s) configured on the desktop provider. After making changes to the networking on an Oracle VM VirtualBox or Microsoft Hyper-V host, click the Refresh button to rescan the network list for the provider.
- View a read-only list of the networks on a specific host - Go to the Desktop Providers category, and select a desktop provider. Then select the host in the Host tab.

VMware vCenter desktop provider notes:

- VMware vCenter networks are not accessible in the Desktop Providers category. You can create and manage networks using VMware vCenter management tools instead.

How to Configure RDP Options Per Pool

With Oracle VDI, you can configure the RDP options to be used by Sun Ray sessions when users connect to their desktops.

VDI Manager Steps

1. Sign into the VDI Manager.
    a. Go to http://<server name>:1800 (or http://localhost:1800 if remote administration has been disabled), and use root user credentials. For a multi-host configuration, use one of the VDI Secondary hosts.
    b. You will be re-directed to https and the browser will ask you to accept the security certificate. After confirmation, you should get the login screen.

2. Select the Pools category and select the pool of interest.
    a. In the pool overview, select the Settings tab.
    b. In the Sun Ray section, click the Edit Sun Ray RDP Settings link.
    c. Enable the desired RDP settings and click Save.
    d. Click Back, and select the Use Customized Settings option in the Sun Ray section.
    e. Click Save.

Available RDP Options

Sun Ray Connector for Windows OS (`uttsc`) supports a wide range of options allowing you to configure RDP connections from Sun Ray to your users' desktops.

Oracle VDI enables you to configure a subset of these options on a per pool basis. The following table lists the supported options. For details about how VDI's Sun Ray settings compare to the SRWC `uttsc` settings, refer to the Oracle Virtual Desktop Infrastructure Defaults page.

Name	Description	Default Value
General		
Locale	Use this setting to identify the locale used for users' desktop sessions. Any valid locale identifer may be specified, for example, `en-US` or `de-DE`.	en-US
Keyboard Layout	Use this setting to identify the keyboard type used for users' desktop sessions Valid values for this setting include All Sun and PC USB Keyboards, Sun Type6 Japanese Keyboard, and Sun Korean Keyboard.	All Sun and PC USB Keyboards
Optimized Hotdesking	Use this setting to enable or disable optimized hotdesking behaviour. If enabled, Sun Ray sessions can be hotdesked without restarting `uttsc`.	Disabled

Windows Pulldown Header	Use this setting to enable or disable the Windows pulldown header.	Enabled
RDP Packet Data Compression	Use this setting to enable or disable the compression of RDP packet data.	Enabled
Appearance		
Colour Depth	Use this setting to specify the preferred colour depth for users' desktop sessions. Valid values for this setting are 8, 15, 16, 24 and 32. Note: Colour depth may be limited by configuration of the desktop to which a user connects. In such cases the available colour depths of the desktop will take priority over the colour depth configured for the pool containing the desktop.	32
Theming	Use this setting to enable or disable theming for users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Desktop Background	Use this setting to enable or disable the desktop background for users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Show Window Contents While Dragging	Use this setting to enable or disable the ability to show complete window contents while dragging windows in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Transition Effects for Menus	Use this setting to enable or disable visual effects during the use of menus in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Pointer Shadow	Use this setting to enable or disable the use of pointer shadow in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Pointer Scheme	Use this setting to enable or disable the use of pointer schemes in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Sound	Use this setting to control sound quality in users' desktop sessions. Valid values for this setting are “High” (to enable high quality sound), “Low” (to enable low quality sound) and “Off” (to disable sound).	High
Redirection		
Smart Cards	Use this setting to enable or disable smart card redirection from a DTU to users' desktop sessions.	Disabled
USB	Use this setting to enable or disable USB redirection from a DTU to users' desktop sessions.	Enabled
Serial Devices	Use this setting to identify serial devices which should be redirected to users' desktop sessions. Valid values for this setting are specified using the format <comport>=<device> where <device> identifies the serial device to be redirected and <comport> identifies the port (on the users' desktops) that <device> should be redirected to.	No serial devices are redirected by default.
Paths	Use this setting to identify paths (available on a VDI host) which should be redirected to drives on users' desktop sessions. Valid values for this setting are specified using the format <drive name>=<path> where <path> identifies the path to be redirected and <drive name> identifies the drive (on the users' desktops) that <path> should be redirected to.	No paths are redirected by default.
Printers	Use this setting to identify printer queues which should be redirected to users' desktop sessions. Valid values for this setting are specified using the format <printer>=[<driver>] where <printer> identifies the printer queue to be redirected and <driver> identifies a printer driver to be used for the printer on users' desktop sessions. If <driver> is omitted, a simple PostScript driver is used by default.	No printer queues are redirected by default.

How to Enable USB Redirection

Before You Begin

1. Prepare your Windows XP virtual machine template by installing the USB Redirector.
   See the How to Install the Sun Ray Connector Windows Components on the SRWC 2.2 information site for more details.

2. Add addtional USB drivers for virtual machines created in VMware vCenter or Microsoft Hyper-V.
   This step is not necessary for VirtualBox virtual machines. See How to Add USB Drivers to a VMware ESX or Hyper-V Server Virtual Machine on the SRWC 2.2 information site for more details.

Steps

1. Import the prepared virtual machine as a template into the VDI host.
   Refer to the following pages:
   - How to Import Desktops (Sun VirtualBox)
   - How to Import Desktops (Microsoft Hyper-V)
   - How to Import Desktops (VMware vCenter)

2. In Pool settings, select Edit RDP Settings. Save settings with USB enabled, select Use Customized RDP Settings, and save again.

3. (Optional) Clone some virtual machines with Sysprep enabled.

4. Once the virtual machine is available, obtain a session for any user, and log into the virtual machine.

5. Choose Computer -> Properties -> Hardware -> Device manager to see whether the driver is visible under USB Serial Bus Controllers.

The virtual machine is now ready to redirect any USB disk.

How to Configure Smart Card Removal

You can control what should happen to a user's desktop after a smartcard is removed from a Sun Ray Thin Client. Using the Smart Card Removal Policy, you can indicate that a user's desktop should be shut down, suspended, or recycled when the smart card has been out of a Sun Ray Thin Client for a specific length of time. If the user reinserts a smart card before the specified time has elapsed, the associated action on the desktop will be canceled. The Smart Card Removal Policy is configurable per pool and is available for all Oracle VDI, Microsoft Hyper-V, and VMware vCenter pools. This policy may be configured using the Oracle VDI Manager or CLI.

Recycling is applied only to desktops that have flexible assignments. Choosing the recycle option for your Smart Card Removal Policy will have no effect on personally assigned desktops.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Navigate to the pool's Settings tab for the pool to be configured.
   a. In the Sun Ray section, indicate the action you want to be associated with removal of smart cards from thin clients using the Action on Card Removal menu.
      - No Action - Select if you want Oracle Virtual Desktop Infrastructure to ignore smart card removals.
      - Recycle Desktop - Select if you want flexibly assigned desktops to be recycled.
      - Shutdown Desktop - Select if you want desktops to be shut down.
      - Suspend - Select if you want desktops to be suspended.
   b. Specify the number of seconds a smart card must be removed from a thin client before any action should be taken in the Delay Action field.
   c. Click Save.

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.

For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

2. Configure the desktop action associated with smart card removal.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p card-removed=<desktop action> <pool
name>
```

3. Specify the length of time (in seconds) that a smart card must be out of a thin client before the action is performed.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p card-removed-timeout=<time in seconds>
<pool name>
```

- Example – Specify the desktop action that should be performed after a smart card has been out of a thin client for a given amount of time

```
# /opt/SUNWvda/sbin/vda pool-setprops -p
card-removed=suspend,card-removed-timeout=30 MyPool
```

How to Create Automated Administration Scripts

The `/opt/SUNWvda/sbin/vda` CLI can be used in scripts for automated administration.

Reading the Return Code

The `/opt/SUNWvda/sbin/vda` returns the following exit codes:

- 0: Successful completion
- 1: An error occurred
- 2: Invalid command line options or arguments were specified

Waiting for a Job to Finish

Some `vda` subcommands return immediately but start an action in the background, a job.
The subcommand `job-wait` allows to synchronously wait for a specific job to be completed.

```
# /opt/SUNWvda/sbin/vda job-wait --help
Wait until the job ends

Usage:
 vda job-wait [-t <timeout> | --timeout=<timeout>] <job>
 -?, --help               Print this help list
Options:
 -t <timeout>, --timeout=<timeout>
                          Timeout in seconds to wait
Operand:
*<job>                    The id of the job
'*' denotes mandatory parameters.
```

Parsing the Output of the CLI

A number of subcommands support a parseable option so that the output is formatted for easy parsing: as a list of lines of colon-separated (':') fields.

The syntax of the option is:

```
-x, --parseable         Display output suitable for programmatic parsing.
```

user-search

Search for users/groups in the user directory that match the specified search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Name of the user/group	string
Kind of object	`User` / `Group`
DN of the user/group	string

user-show

Show the desktops available for the user.

Parseable Output in the case of a user: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token <token>` / `Group <group_name>` / `Custom Group <group_name>`

Parseable Output in the case of a group: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

user-desktops

Show the desktops assigned to the user.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

group-list

Lists all custom groups.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format

Custom Group Name	string

group-show

Show the pools assigned to the custom group.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

token-search

Search for tokens that match the search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Token	string
Name of the Associated User	string
DN of the Associated User	string

token-show

Show the desktops available for the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token` / `Group <group_name>` / `Custom Group <group_name>`

token-desktops

Show the desktops assigned to the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

pool-list

List all pools.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Type of Desktop Assignment	`Personal` / `Flexible`
Number of Desktops	integer
Desktop Provider Name	string

pool-show

Show detailed information about the pool.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Assignment Status	`Enabled` / `Disabled`
Type of Desktop Assignment	`Personal` / `Flexible`
Desktop Provider Name	string
Cloning Status	`Enabled` / `Disabled`
Template	`None` / string
Number of Cloning Jobs	integer
Number of Available Desktops	integer
Number of Assigned Desktops	integer
Total Number of Desktops	integer
Guest Pool	`Enabled` / `Disabled`

pool-desktops

List all desktops from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Unknown`
Desktop State	`Available` / `Used` / `Idle` / `Unresponsive` / `Reserved` / etc.
DN of Assigned User	string

pool-templates

List all templates from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long

Machine State	`Running` / `Powered Off` / `Suspended` / `Aborted` / `Unknown`
Master Revision	string
Cloned Desktops	string

template-revisions

List the revisions of the template.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Revision Name	string
Revision ID	long
Creation Date	timestamp
Is It Master	`yes` / `no`
Cloned Desktops	string

provider-list

List all desktop providers.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Provider Name	string
Provider Type	`Sun VirtualBox` / `VMware vCenter` / `Microsoft Hyper-V` / `Microsoft Remote Desktop`
Total Number of Desktops	integer
Number of Used Desktops	integer
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Storage Usage	`xx% (x.x GB/MB)`

provider-list-hosts

List all hosts for the VirtualBox desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Status	`OK` / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Number of Desktops	integer

provider-list-storage

List all storage servers for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Status	OK / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
ZFS Pool	string
Capacity	`xxx.x GB`
Usage	`xx.x GB`
Number of Desktops	integer

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Storage ID	string
ZFS Pool	string
Capacity	`xxx.x GB`
Usage	`xx.x GB`
Number of Desktops	integer

provider-list-templates

List the templates for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	string
Path	string

provider-list-unmanaged

List the desktops from the virtualization platform that are not managed by any desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format

Host Name	string
Desktop Name	string
Desktop ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	string

provider-list-networks

List all networks for the desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Subnet Label	String
Subnet Address	String
Availability	`All Hosts` / `Not on: <comma_separated_list_of_hosts>`

job-list

List the existing jobs.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
ID of the Job	integer
Cancellable	'C' if the job can be cancelled

job-show

Show the job details.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string

Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
Start Time	hh:mm:ss
End Time	hh:mm:ss
Job Details	string
Cancellable	`true` / `false`

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Desktop Management (All Topics)

About Desktops

The term desktop refers to an instance of an operating system running on a virtualization host. It is delivered to a user and accessed via a desktop access client. Oracle Virtual Desktop Infrastructure manages desktops on any of the four platforms:

- Oracle VM VirtualBox
- VMware Infrastructure
- Microsoft Hyper-V
- Microsoft Remote Desktop

Desktops may be created one-by-one for each user, but in most situations there will be groups of users that require the same applications. Oracle Virtual Desktop Infrastructure allows you to prepare and use a desktop template, and clone as many desktops as needed from the template. For more on templates, refer to the About Templates and Revisions page.

Available Actions for Desktops

Not all actions are available for all platforms. VMware has its own management tool VMware vCenter, and the Oracle VDI Core simply accesses the data. Microsoft Remote Desktop is not a virtualization platform like the others, therefore desktops cannot be imported and assigned personally.

Action	Details	Location in Oracle VDI Manager	**vda** Subcommand	Desktop Provider

Import Desktop	Imports a virtual machine into the Oracle VDI Core. After that the desktop can be assigned to any user. Oracle VM VirtualBox and Microsoft Hyper-V hosted machines can be imported from a shared folder. In addition, virtual machines can be directly imported from a Oracle VM VirtualBox host. For VMware vCenter, the virtual machines remain under the control of VMware vCenter, but the user assignment and runtime management is done by the Oracle VDI Core.	Desktop Tab -> Import (button)	`pool-vb-import`
			`pool-vb-import-unmanaged`
			`pool-vc-import`
			`pool-hv-import`
				• Oracle VDI
				• Hyper-V
				• VMware
				• Generic

Duplicate Desktops	Creates an identical clone of any desktop.	Desktop Tab -> Duplicate (in Menu)	`desktop-duplicate`	• Oracle VDI • Hyper-V
Rename Desktop	Renames the desktop. The name is also visible to the end-user if more than one desktop is assigned to her.	Desktop Tab -> Rename (in Menu)	`desktop-setprops`	• Oracle VDI • Hyper-V • Generic
Export Desktop	Exports the selected desktop to disk, consisting of an XML file for the properties of the virtual machine and a VDI file for the content of the desktop's hard drive. The exported desktop can then be stored and used outside the Oracle VDI Core.	Desktop Tab -> Export (in Menu)	`desktop-export`	• Oracle VDI
Delete Desktop	If necessary, the desktop is stopped. Then for Oracle VM VirtualBox and Microsoft Hyper-V hosted desktops, the iSCSI disk is deleted from the storage. For VMware vCenter desktops, you have the option to keep the virtual machine available on VMware vCenter. All references to the desktop are removed from the Oracle VDI Core database.	Desktop Tab -> Delete Desktop (in Menu)	`desktop-delete`	• Oracle VDI • Hyper-V • VMware • Generic
Convert Desktop to Template	Moves the desktop to the template management of the pool and creates a first revision.	Desktop Tab -> Convert to Template (in Menu)	`desktop-template`	• Oracle VDI • Hyper-V
Reset Cloning	Regardless of the recycle policy all cloned desktops (that are not currently in use or personally assigned) are deleted and new desktops are cloned. You can use this action to make sure that all desktops are cloned from the same template or the latest master revision, and use the latest settings from the Pools-Cloning tab, like naming conventions or Windows system preparation.	Desktop Tab -> Reset Cloning (in Menu)		• Oracle VDI • Hyper-V • VMware

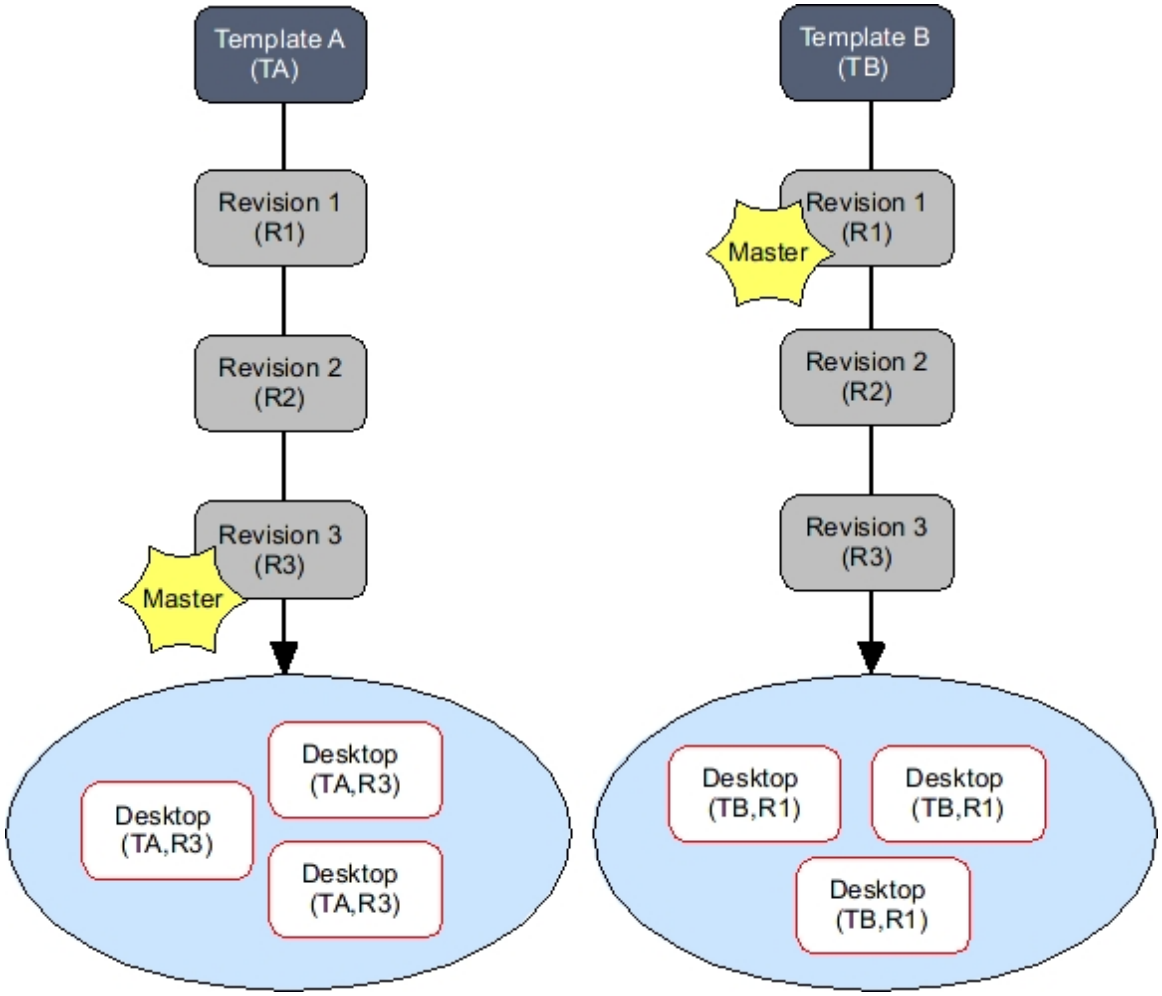
Assign Desktop	Creates a persistent relation between a user and the desktop. This desktop will be reserved for the user as their personal desktop.	Desktop Tab -> Assign (button)	`user-personaldesktop`	• Oracle VDI • Hyper-V • VMware • Generic
Remove User	Breaks the persistent relation between user and desktop.	Desktop Tab -> Remove User (in Menu)	`user-unassign`	• Oracle VDI • Hyper-V • VMware • Generic
Log Out User	Logs the user out of their RDS session, and the session no longer exists.	Desktop Tab -> Log Out User (button)	`desktop-logoff`	• MS Remote
Disconnect	Disconnects the user from their RDS session, but the session remains on the RDS Session Host and the user can reconnect to it later.	Desktop Tab -> Disconnect (button)	`desktop-disconnect`	• MS Remote
Start Desktop	Starts the desktop on the host. If the desktop is not registered on the host, one is selected based on free memory. The desktop is then registered and started.	Desktop Tab -> Start (button)	`desktop-start`	• Oracle VDI • Hyper-V • VMware
Shut Down Desktop	Sends an ACPI shutdown signal to the desktop.	Desktop Tab -> Shut Down (in Menu)	`desktop-stop` (without '-p' option)	• Oracle VDI • Hyper-V • VMware
Restart Desktop	Restarts the desktop on the same host. Equivalent to pressing the reset button on your PC and can cause data loss if files are open.	Desktop Tab -> Restart (button)	`desktop-restart`	• Oracle VDI • Hyper-V • VMware
Power Off Desktop	Immediately powers-off the desktop and unregisters it from the Oracle VM VirtualBox or Microsoft Hyper-V virtualization host. On a VMware vCenter virtualization host, the desktop is only powered off.	Desktop Tab -> Power Off (in Menu)	`desktop-stop -p` (with '-p' option)	• Oracle VDI • Hyper-V • VMware
Suspend Desktop	Saves the desktop's state to disk. When the desktop is resumed it will be in the same state prior to being suspended.	Desktop Tab -> Suspend (in Menu)	`desktop-suspend`	• Oracle VDI • Hyper-V • VMware
Open Desktop Console	Opens a new window to access the desktop directly from the browser.	Desktop Tab -> Console Tab -> Open in Window (button)	–	• Oracle VDI

Mount or Unmount ISO	Mounts or unmounts an ISO image on the virtual machine.	Desktop Tab -> Mount ISO Image, or Unmount ISO Image (in Menu)	`desktop-mount-iso` `desktop-unmount-iso`	• Oracle VDI • Hyper-V
Activate Desktop	In some error situations, the Oracle VDI Core will mark a desktop "unresponsive" rendering the desktop unusable. Select Activate to return the desktop to the previous state.	Desktop Tab -> Activate (in Menu)	`desktop-activate`	• Oracle VDI • Hyper-V

About Templates and Revisions

The term template refers to a special desktop that is used for cloning. For more about desktops, refer to the About Desktops page. In order to fill a pool with several identical desktops, a template is required to clone the desired amount of desktops. Selecting and managing templates is different for each platform. Oracle Virtual Desktop Infrastructure offers template management for Oracle VDI and Microsoft Hyper-V desktop pools. VMware Infrastructure has its own template management and therefore Oracle Virtual Desktop Infrastructure offers access to the list of available templates in VMware vCenter.

Oracle Virtual Desktop Infrastructure also offers template revisions for Oracle VDI and Microsoft Hyper-V desktop pools. Revisions provide much more flexibility whenever you need to update the template. Think of revisions as a snapshot of a desktop template. You might import a template and fill a pool with clones of the template, only to realize that you forgot to install an application. You can simply revise the existing template, and clone from it. You can also test revisions before cloning in large scale, and revert back to revisions if you choose to. The history of your template will be saved through its revisions.



Available Actions for Templates

There are a number of available actions for templates and revisions.

Action	Details	Location in Oracle VDI Manager	**vda** Subcommand	Desktop Provider

Import Template	Imports a virtual machine into the Oracle VDI Core, and creates a first revision. The revision can be used for cloning in any pool that uses the same desktop provider.	Template Tab -> Import Template (button)	`pool-vb-import`
			`pool-vb-import-unmanaged`
			
			`pool-vc-import`
			`pool-hv-import`
				• Oracle VDI
				• Hyper-V

Open Console	Opens a new window to access the template directly from the browser.	Template Tab -> Open Console (button)	–	• Oracle VDI
Create Revision	Saves the current state of the template as a new revision.	Template Tab -> Create Revision (button)	`revision-create`	• Oracle VDI • Hyper-V
Rename	Renames the template or revision.	Template Tab -> Rename (in Menu)	`template-setprops`	• Oracle VDI • Hyper-V
Copy Template to Desktop	Copies the template to a usable desktop. Formerly called "Convert to Desktop".	Template Tab -> Copy to Desktop (in Menu)	`template-desktop`	• Oracle VDI • Hyper-V
Export Template	Exports the selected template to disk, consisting of an XML file for the properties of the virtual machine and a VDI file for the content of the template's hard drive. The exported desktop can then be stored and used outside the Oracle VDI Core.	Template Tab -> Export (in Menu)	`template-export`	• Oracle VDI
Start Template	Starts the desktop in order to apply changes to the template.	Template Tab -> Start (in Menu)	`template-start`	• Oracle VDI • Hyper-V
Restart Template	Restarts the template on the same host. Equivalent to pressing the reset button on your PC and can cause data loss if files are open.	Template Tab -> Restart (in Menu)	`template-restart`	• Oracle VDI • Hyper-V
Shut Down Template	Sends an ACPI shutdown signal to the template.	Template Tab -> Shut Down (in Menu)	`template-stop` (without '-p' option)	
Power Off Template	Immediately powers-off the template and unregisters it from the virtualization host.	Template Tab -> Power Off (in Menu)	`template-stop -p` (with '-p' option)	• Oracle VDI • Hyper-V

Mount or Unmount ISO	Mounts or unmounts an ISO image on the virtual machine.	Template Tab -> Mount ISO Image, or Unmount ISO Image (in Menu)	`template-mount-iso` `template-unmount-iso`	• Oracle VDI • Hyper-V
Apply for Cloning	If automatic cloning is selected as a pool setting, any fresh desktops for the pool will be cloned from the template that has been applied for cloning.	Template Tab -> Apply for Cloning in Pool (in Menu)	`pool-setprops`	• Oracle VDI • Hyper-V
Revert Template	Reverts the template to the most recent revision.	Template Tab -> Revert (in Menu)	`template-revert`	• Oracle VDI • Hyper-V
Delete Template	Delete the template and all the corresponding revisions of the template.	Template Tab -> Delete (in Menu)	`template-delete`	• Oracle VDI • Hyper-V

Available Actions for Revisions

Action	Details	Location in Oracle VDI Manager	**vda** Subcommand	Virtualization Platform
Make Revision Master	Marks the revision for cloning in pools that have selected the template for cloning.	Templates Tab -> Make Master (button)	`revision-setprops`	• Oracle VDI • Hyper-V
Rename Revision	Renames the revision.	Templates Tab -> Rename (in Menu)	`revision-setprops`	• Oracle VDI • Hyper-V
Copy Revision to Template	Creates a new template based on this revision. Use this action to create an independent branch of any existing revision.	Templates Tab -> Copy to Template (in Menu)	`template-create`	• Oracle VDI • Hyper-V
Copy Revision to Desktop	Creates a new independent desktop in the same pool.	Templates Tab -> Copy to Desktop (in Menu)	`revision-desktop`	• Oracle VDI • Hyper-V
Clone Revision	Creates a desktop based on the selected revision in the same pool.	Templates Tab -> Clone Desktop (in Menu?)	`revision-clone`	• Oracle VDI • Hyper-V
Export Revision	Exports the selected revision to disk, consisting of an XML file for the properties of the virtual machine and a VDI file for the content of the desktop's hard drive. The exported desktop can then be stored and used outside the Oracle VDI Core.	Templates Tab -> Export (in Menu)	`revision-export`	• Oracle VDI

Apply System Preparation to Revision	Internally a clone is created and started to call the Windows Sysprep command. After that a new snapshot is taken that will be used for cloning the desktops in the pools.	Templates Tab -> System Preparation (in Menu)	`revision-sysprep`	• Oracle VDI • Hyper-V
Apply for Cloning	Selects a pool that should use a specific revision for cloning. Otherwise the master revision will be used.	Templates Tab -> Apply for Cloning (in Menu)	`pool-setprops`	• Oracle VDI • Hyper-V
Delete Revision	For Oracle VDI and Hyper-V the iSCSI disk is deleted from the storage. For VMware you have the option to keep the virtual machine available on vCenter. All references to the revision are removed from the Oracle VDI Core database.	Templates Tab -> Delete (in Menu)	`revision-delete`	• Oracle VDI • Hyper-V

About Desktop and Virtual Machine States

In Oracle Virtual Desktop Infrastructure, a user is assigned to one or several virtual desktops and can use these desktops from everywhere as if they were running on a traditional personal computer. Oracle Virtual Desktop Infrastructure provides advanced management and lifecycle features which allow the effective management of thousands of desktops. Desktops transition through states defined by settings in the Oracle VDI Core.

Virtual machines are used to run the operating systems which render the desktops. They are controlled by a hypervisor, such as Oracle VDI Hypervisor, Microsoft Hyper-V, and VMware Infrastructure. They cycle through traditional machine states such as powered off and running.

Virtual Machine States

Virtual machine states are defined by the virtualization platform. You have the choice of using an Oracle VM VirtualBox, VMware Infrastructure, or Microsoft Hyper-V virtualization platform.

Oracle VM VirtualBox and Microsoft Hyper-V

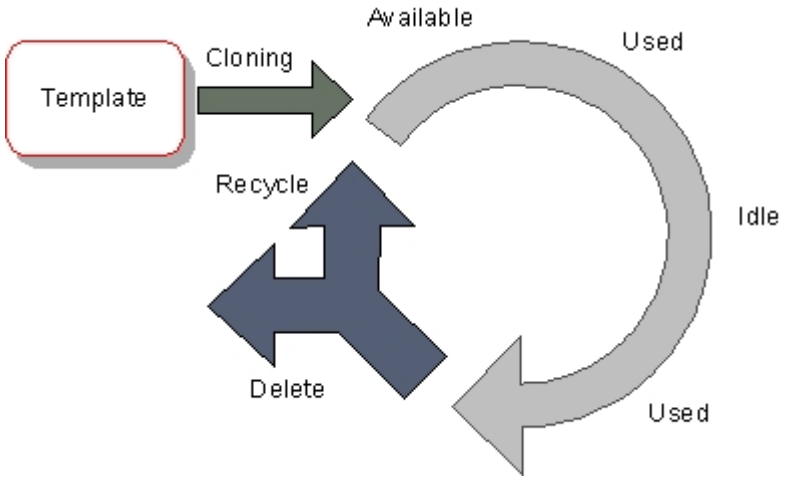
- Powered Off
  Powered off virtual machines reside in two places in the Oracle Virtual Desktop Infrastructure environment, the database and the storage. The Oracle VDI Core database contains the desktop configuration information to register the desktop on a hypervisor. The storage server contains the desktop's hard disk data.
  Powered off virtual machines are typically not associated or registered on any hypervisor host. This strategy enables the Oracle VDI Core to select the best suited host on every start of a virtual machine. This setup helps ensure a distribution of virtual machines across available Oracle VM VirtualBox or Microsoft Hyper-V hosts minimizing resource usage on each.
- Running
  Running desktops are registered and started on a single hypervisor host. The host that a virtual machine is running on can be determined using the Desktop Summary page in the Oracle VDI Manager. A running virtual machine is connected directly to the storage.
- Suspended
  Suspended virtual machines have been suspended by the hypervisor.
- Stuck, Aborted, Paused
  These machine states are specific to Oracle VM VirtualBox.
- Unknown
  This state typically indicates that the vCenter server cannot be contacted to retrieve the state information.

Desktop States

The desktop states are used to accomplish the following:

- Implement the desktop lifecycle.
- Synchronize Oracle VDI Core hosts and virtualization platform.
- Serve as a tool for monitoring and analyzing the system state.

The following figure depicts a simplified version of the lifecycle of a flexibly assigned desktop.



Possible desktop states are:

- Available - The first state
  A desktop is added to the database and then set to the Available state after being cloned from a template. After becoming Available, the desktop is ready to be assigned to users. If the recycle policy is set to Reuse Desktop or Reset to Snapshot, the desktop will return to this state.

- Idle - The intermediate state
  The desktop is in this state whenever the desktop is assigned and the user is not using it, for example, when the desktop is assigned and the user has not logged in yet or when the desktop is assigned and the user just logged out. A desktop is recycled after it remains in that state for a configurable amount of time.

  The VMware vCenter desktop provider has two additional Idle states: when the desktop is assigned and either the virtual machine is suspended or the guest OS goes into standby through the vCenter option Keep VM Running on Guest OS Standby.

- Used - The active state
  A desktop enters the Used state as soon as the user has logged in to the desktop. The desktop stays in this state while the user logs in, uses the desktop, and logs out.

- Reserved - The maintenance state
  A desktop is Reserved when it is being worked on by the Oracle VDI Core. This desktop state usually occurs when the desktop is the source of a manual copy operation or the desktop is recycled. The desktop will become Available after leaving the Reserved state.

- Unresponsive - The quarantine state
  The desktop enters the Unresponsive state whenever the Oracle VDI core determines a severe problem with the desktop. An unresponsive desktop is outside the desktop life cycle and needs the attention of the administrator. The administrator may either fix the problem and apply the Activate action to the desktop, which puts the desktop back in the lifecycle, or the administrator may choose to delete the desktop.

Best Practices for Desktops

Each desktop OS can be optimized for performance in a virtual machine. The following guidelines outline the desktop image settings that will maximize desktop performance in Oracle Virtual Desktop Infrastructure. These are not requirements, they are suggestions for better performance.

Before You Begin

Install the desktop OS by referring to the following information:

How to Create Virtual Machines (Oracle VDI Hypervisor)
How to Create Virtual Machines (VMware vCenter)
How to Create Virtual Machines (Microsoft Hyper-V)

Windows 7

Cloning Preparation

Oracle VM VirtualBox and Microsoft Hyper-V Only
Oracle VDI Fast Preparation (FastPrep) and Windows System Preparation (Sysprep) enable cloning of Windows desktops by the Oracle VDI Core. Oracle VDI FastPrep can be configured within a pool without any desktop preparation. Before enabling Windows System Preparation for a pool, the desktop must be prepared using the steps below.

1. Disable the Windows Media Player Network Sharing Service.
   Due to a bug in Windows 7, the Windows Media Player Network Sharing Service causes the Windows Sysprep tool to hang. If you do not need this service enabled in your Windows 7 desktops and you intend to run System Preparation from the Oracle VDI Manager, stop and disable it. If you prefer to leave this service enabled, run Sysprep manually from within the template before importing it.
   - For details about disabling Windows services, refer to the "Disable unwanted services" topic under System and Security below.
   - To run Sysprep manually

     ```
     sysprep.exe -generalize -oobe -shutdown -quiet
     ```

2. (Microsoft Hyper-V Only) Install the Oracle VDI Tools on the template.
   The System Preparation action in the Template tab will not work if you do not have the tools (`vda-tools-x86.msi}}for 32-bit platforms or {{vda-tools-x64.msi` for 64-bit platforms) installed on your template.

For information about how to enable System Preparation in a desktop pool, refer to How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V).

Appearance and Personalization

1. Go to the Personalization menu.
   Right-click on the desktop and select Personalize.
   Or, select Start, Control Panel, Appearance and Personalization, then Personalization.

   - Set a plain desktop background.
     a. Select Desktop Background from the Personalization menu.
     b. Select Solid Colors in the Picture Location menu.

   - Set a blank screen saver with password protect on resume.
     a. Select Screen Saver from the Personalization menu.
     b. Set the screen saver to Blank, and check the On resume, display logon screen box.

   - Disable Windows sounds.
     a. Select Sound from the Personalization menu.
     b. On the Sounds tab, select No Sounds under Sound Scheme.

   - (VRDP Only) Change mouse pointers.
     a. Select Change mouse pointers from the left sidebar of the Personalization menu.
     b. In the Scheme menu, select Windows Black (system scheme).

   - Save your settings as a Theme.
     a. Select Save theme from the Personalization menu.
     b. Choose a name for the theme.

2. Go to the Display menu.
   Select Start, Control Panel, Appearance and Personalization, then Display.

   - Ensure hardware acceleration is enabled.

a. Select Change display settings in the left sidebar, then click Advanced Settings.
b. Select the Troubleshoot tab, then Change settings, and ensure that the Hardware acceleration is set to Full.

System and Security

1. Go to the System and Maintenance menu.
   Select Start, Control Panel, then System and Security.

   - Optimize visual effects performance.
     a. Select System from the System and Security menu.
     b. Select Advanced system settings in the left sidebar. Then select Settings under he Performance heading on the Advanced tab.
     c. On the Visual Effects tab, choose Adjust for best performance.
        For a less drastic option, select Let Windows choose what's best for my computer.

   - Install Windows updates.
     a. Select Windows Update from the System and Security menu.
     b. Select Check for updates, then Install updates.

   - (VMware vCenter Only) Configure power management.
     a. Configure power management on the guest operating system.
        i. Select Power Options from the System and Security menu.
        ii. Click Change when the computer sleeps in the left sidebar, and set the desired value.
     b. Configure power management in the Virtual Infrastructure Client.
        i. Open the Virtual Infrastructure Client.
        ii. Right-click on the desired virtual machine and go to Edit Settings.
        iii. Go to Options, then Power Management, and select Suspend the Virtual Machine.

   - Run defragmentation and turn off scheduled defragmentation.
     a. Select Defragment your hard drive under the Administrative Tools heading, on the System and Security menu.
     b. If under Schedule you see Scheduled defragmentation is turned on, select Configure Schedule. Ensure the Run on a schedule box is not checked.
     c. Then choose a disk and select Defragment disk.

   - Disable unwanted services.
     a. Select Administrative Tools from the System and Security menu.
     b. Select Services.
        At a minimum, disable the Windows Search and the SuperFetch Service.
     c. Right click on the service name and select Properties.
     d. Choose Disabled for the Startup type.
     e. Stop service by right clicking on it and selecting Stop.

   - Disable scheduled virus scanners.
     a. Select Schedule tasks under the Administrative Tools heading, on the System and Security menu.
     b. In the left sidebar, open the Task Scheduler Library and navigate your virus scanner's folder.
     c. In the right sidebar, select Disable.
     d. Disable any other unwanted tasks.

Other

- Choose which programs start when Windows starts.
  1. Select Start, All Programs, Accessories, then Run.
  2. Type 'msconfig' and click OK.
  3. Select the Startup tab.
  4. Uncheck any programs that you do not want Windows to run at startup.

- Reduce recycle bin drive space usage.
  1. By default, the Recycle Bin is located on the Desktop. Right-click on it, then select Properties.
  2. On the General tab, select Custom size, and enter the desired value.

- Run Disk Cleanup.
  1. Select Start, then Computer.

2. Right click on Local Disk (C:) and select Properties.
3. Click Disk Cleanup on the General tab.

Windows Vista

Cloning Preparation

Oracle VM VirtualBox and Microsoft Hyper-V Only
Oracle VDI Fast Preparation (FastPrep) and Windows System Preparation (Sysprep) enable cloning of Windows desktops by the Oracle VDI Core. Oracle VDI FastPrep can be configured within a pool without any desktop preparation. Before enabling Windows System Preparation for a pool, the desktop must be prepared using the steps below.

- (Microsoft Hyper-V Only) Install the Oracle VDI Tools on the template.
  The System Preparation action in the Template tab will not work if you do not have the tools (`vda-tools-x86.msi}}for 32-bit platforms or {{vda-tools-x64.msi` for 64-bit platforms) installed on your template.

For information about how to enable System Preparation in a desktop pool, refer to How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V).

Appearance and Personalization

1. Go to the Personalization menu.
   Right-click on the desktop and select Personalize.
   Or, select Start, Control Panel, Appearance and Personalization, then Personalization.

   - Set a plain desktop background.
     a. Select Desktop Background from the Personalization menu.
     b. Select Solid Colors in the Picture Location menu.

   - Set a blank screen saver with password protect on resume.
     a. Select Screen Saver from the Personalization menu.
     b. Set the screen saver to Blank, and check the On resume, display logon screen box.

   - Disable Windows sounds.
     a. Select Sounds from the Personalization menu.
     b. On the Sounds tab, select No Sounds under Sound Scheme.

   - (VRDP Only) Change mouse pointers.
     a. Select Mouse Pointers from the Personalization menu.
     b. In the Scheme menu, select Windows Black (system scheme).

   - Save your settings as a Theme.
     a. Select Theme from the Personalization menu.
     b. On the Themes tab, under the Theme menu, Modified Theme should be highlighted because personalization settings have been changed. If it is not highlighted, it is possible your personalization changes were not saved.
     c. Select Save As, and choose a name for the theme.

   - Ensure hardware acceleration is enabled.
     a. Select Display Settings from the Personalization menu.
     b. Click Advanced Settings and then Change settings on the Troubleshoot tab.
     c. Ensure that the Hardware acceleration is set to Full.

System and Maintenance

1. Go to the System and Maintenance menu.
   Select Start, Control Panel, then System and Maintenance.

   - Optimize visual effects performance.
     a. Select System from the System and Maintenance menu.
     b. Click Advanced system settings in the left sidebar. Then click the Settings button under Performance on the Advanced tab.

c. On the Visual Effects tab, choose Adjust for best performance.
For a less drastic option, select Let Windows choose what's best for my computer.

- (VMware vCenter Only) Configure power management.
  a. Configure power management on the guest operating system.
     i. Select Change when the computer sleeps under the Power Options heading, on the System and Maintenance menu.
     ii. Click Change when the computer sleeps in the left sidebar, and set the desired value.
  b. Configure power management in the Virtual Infrastructure Client.
     i. Open the Virtual Infrastructure Client.
     ii. Right-click on the desired virtual machine and go to Edit Settings.
     iii. Go to Options, then Power Management, and select Suspend the Virtual Machine.

- Run defragmentation and turn off scheduled defragmentation.
  a. Select Defragment your hard drive under the Administrative Tools heading, on the System and Maintenance menu.
  b. Ensure the Run on a schedule box is not checked.
  c. Then select Defragment now.

- Disable unwanted services.
  a. Select Administrative Tools from the System and Maintenance menu.
  b. Select Services.
  At a minimum, disable the Indexing Service and the SuperFetch Service.
  c. Right click on the service name and select Properties.
  d. Choose Disabled for the Startup type.
  e. Stop service by right clicking on it and selecting Stop.

- Disable scheduled virus scanners.
  a. Select Schedule tasks under the Administrative Tools heading, on the System and Maintenance menu.
  b. In the left sidebar, open the Task Scheduler Library and navigate your virus scanner's folder.
  c. In the right sidebar, select Disable.
  d. Disable any other unwanted tasks.

Other

- Install Windows updates.
  1. Select Start, then Control Panel.
  2. Select Check for updates, then Install updates.

- Choose which programs start when Windows starts.
  1. Select Start, All Programs, Accessories, then Run.
  2. Type 'msconfig' and click OK.
  3. Select the Startup tab.
  4. Uncheck any programs that you do not want Windows to run at startup.

- Reduce recycle bin drive space usage.
  1. By default, the Recycle Bin is located on the Desktop. Right-click on it, then select Properties.
  2. On the General tab, select Custom size, and enter the desired value.

- Run Disk Cleanup.
  1. Select Start, then Computer.
  2. Right click on Local Disk (C:) and select Properties.
  3. Click Disk Cleanup on the General tab.

Windows XP

Cloning Preparation

Oracle VM VirtualBox and Microsoft Hyper-V Only
Oracle VDI Fast Preparation (FastPrep) and Windows System Preparation (Sysprep) enable cloning of Windows desktops by the Oracle VDI Core. Oracle VDI FastPrep can be configured within a pool without any desktop preparation. Before enabling Windows System Preparation for a pool, the desktop must be prepared using the steps below.

1. (Microsoft Hyper-V Only) Install the Oracle VDI Tools on the template.

The System Preparation action in the Template tab will not work if you do not have the tools (`vda-tools-x86.msi` for 32-bit platforms or `vda-tools-x64.msi` for 64-bit platforms) installed on your template.

2. Install System Preparation.
    a. Log in to the template and download the appropriate Windows XP Deployment Tools for your version of Windows XP.
        - Windows XP Service Pack 2 Deployment Tools
        - Windows XP Service Pack 3 Deployment Tools
    b. Create a directory on the virtual machine named `C:\Sysprep`.
    c. Unpack the contents of the Windows XP Deployment Tools (`deploy.cab`) into the `C:\Sysprep` directory.

For information about how to enable System Preparation in a desktop pool, refer to How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V).

Appearance and Themes

1. Go to the Display Properties menu.
   Right-click on the desktop and select Properties.
   Or, select Start, Control Panel, Appearance and Themes, then Change the computer's theme.

    - Set a plain desktop background.
        a. Select the Display tab from the Display Properties menu.
        b. Under Background, select None.
        c. Select Apply.

    - Set a blank screen saver with password protect on resume.
        a. Select the Screen Saver tab from the Display Properties menu.
        b. Set the screen saver to Blank, and check the On resume, display logon screen box.
        c. Select Apply.

    - Ensure hardware acceleration is enabled.
        a. Select the Settings tab from the Display Properties menu.
        b. Then select Advanced.
        c. On the Troubleshooting tab, ensure that the Hardware acceleration is set to Full.
        d. Select Apply.

    - Save your settings as a Theme.
        a. Select Themes tab from the Display Properties menu.
        b. Under the Theme menu, Modified Theme should be highlighted because display properties have been changed. If it is not highlighted, it is possible your personalization changes were not saved.
        c. Select Save As, and choose a name for the theme.

Performance and Maintenance

1. Go to the Performance and Maintenance menu.
   Select Start, Control Panel, then Performance and Maintenance.

    - Optimize visual effects performance.
        a. Select Adjust visual effects from the Performance and Maintenance menu.
        b. On the Visual Effects tab, choose Adjust for best performance.
           For a less drastic option, select Let Windows choose what's best for my computer.

    - (VMware vCenter Only) Configure power management.
        a. Configure power management on the guest operating system.
            i. Select Power Options from the Performance and Maintenance menu.
            ii. Set the System standby time to the desired value.
        b. Configure power management in the Virtual Infrastructure Client.
            i. Open the Virtual Infrastructure Client.
            ii. Right-click on the desired virtual machine and go to Edit Settings.
            iii. Go to Options, then Power Management, and select Suspend the Virtual Machine.

    - Disable scheduled virus scanners.
        a. Select Scheduled tasks from the Performance and Maintenance menu.
        b. Right-click the virus scanner, and select Properties.
        c. Uncheck the Enabled (scheduled task runs at specified time) box.

d. Disable any other unwanted tasks.

- Disable unwanted services.
  a. Select Administrative Tools from the Performance and Maintenance menu.
  b. Select Services.
  At a minimum, disable the Indexing Service.
  c. Right click on the service name and select Properties.
  d. Choose Disabled for the Startup type.
  e. Stop service by right clicking on it and selecting Stop.

- Run defragmentation.
  a. Select Administrative Tools from the Performance and Maintenance menu.
  b. Select Computer Management, then Disk Defragmenter from the left sidebar.
  c. Select a disk, then Defragment.

Other

- Turn off automatic defragmentation.
  1. Select Start, then Run.
  2. Type 'regedit' and click OK.
  3. In the registry editor, expand `HKEY_LOCAL_MACHINE`, `SOFTWARE`, `Microsoft`, then `Dfrg`.
  4. Select `BootOptimizeFunction`.
  5. In the right side of the registry editor, check if `Enable` already exists. If it does not exist, create it.
     - Right click on the right side of the registry editor.
     - Select New, then String Value. Name it "Enable".
  6. Select `Enable`, and enter 'N' to turn off automatic disk defragmentation.

- Choose which programs start when Windows starts.
  1. Select Start, the Run.
  2. Type 'msconfig' and click OK.
  3. Select the Startup tab.
  4. Uncheck any programs that you do not want Windows to run at startup.

- Disable Windows sounds.
  1. Select Start, Control Panel, Sounds, Speech, and Audio Devices, then Change the sound scheme.
  2. On the Sounds tab, select No Sounds under Sound scheme.
  3. Select Apply.

- (VRDP Only) Change mouse pointers.
  1. Select Start, Control Panel, Printers and Other Hardware, then Mouse.
  2. On the Pointers tab, select Windows Black (system scheme) in the Scheme menu.
  3. Select Apply.

- Install Windows updates.
  1. Select Start, then All Programs.
  2. Select Windows Update.

- Reduce recycle bin drive space usage.
  1. By default, the Recycle Bin is located on the Desktop. Right-click on it, then select Properties.
  2. On the Global tab, select Use one setting for all drives.
  3. Move the slider to the desired value.

- Run Disk Cleanup.
  1. Go to Start, then My Computer.
  2. Right click on Local Disk (C:) and select Properties.
  3. On the General tab, click Disk Cleanup.

Other Operating Systems

Best practices for desktops running other OSes, than detailed above, are coming soon!
Until then, here are some basic guidelines:

- Do not use desktop wallpaper.
- Do not use scheduled virus scanners.
- Do not use scheduled defragmentation.
- (VRDP Only) Do not use a mouse pointer theme that uses alpha blending.

How to Create Virtual Machines (Oracle VDI Hypervisor)

Oracle Virtual Desktop Infrastructure presents users with easy access to their virtual desktops, instances of any desktop operating system executed in a virtual machine. You can manually create virtual machines, or you can configure the Oracle VDI Core to create or clone additional virtual machines automatically from a template.

Before You Begin

After installing Oracle VM VirtualBox, you can create your first virtual machine. It is possible to create virtual machines on the server installation or a local installation of Oracle VM VirtualBox. If you choose to use a local installation of Oracle VM VirtualBox to create virtual machines, be sure to use the same version of Oracle VM VirtualBox that you have installed as part of your Oracle VDI Hypervisor. You can download the Oracle Virtual Desktop Infrastructure supported local version from the Oracle VM VirtualBox download site. See the Oracle Virtual Desktop Infrastructure 3.2.2 Release Notes for addition version support information.

Steps

1. Launch the Oracle VM VirtualBox Web Console.

```
# /opt/VirtualBox/VirtualBox
```

   a. Click New to launch the New Virtual Machine wizard.
   b. The wizard will guide you through virtual machine creation.
      Be sure to choose the appropriate hard-disk and RAM space for the desired configuration.
      i. Windows Vista and Windows 7 - minimum of 1024 MB RAM and 5723 MB hard disk are recommended.
      ii. Windows 2000 and Windows XP - minimum of 384 MB RAM and 4 GB hard disk are recommended.
      For more information about virtual machine system requirements, refer to the Oracle VM VirtualBox User Manual.

2. Install the operating system.
   At this point you have an empty virtual machine, equivalent to a PC without an OS installed. The next step is to choose the boot medium for the OS and install it.
   a. Select the newly created virtual machine and click Settings.
   b. Open the Advanced tab in the Settings GUI.
   c. Ensure that CD/DVD-ROM is set as the first boot device.
   d. Select the CD/DVD-ROM option in the left panel of the Settings dialog.
   e. Select the Mount CD/DVD Drive option.
   f. Click OK to save the changes and close the Settings GUI.
      At this point the new virtual machine must be started to trigger the OS installation.
   g. Select the new virtual machine and click Start.
   h. Follow the installation prompts, or seek further installation details from the OS manufacturer.

3. Install the Oracle VM VirtualBox Guest Additions.
   Oracle VM VirtualBox for VDI 3.2 provides a Windows Guest Addition module for automated logons on Windows XP, Windows Vista, and Windows 7 guest OSes. The Auto-Logon feature can only be enabled during Guest Additions installation. You have the optional to install the traditional Guest Additions or Guest Additions with Auto-Logon.
   - Install Guest Additions without Auto-Logon:
     a. With the virtual machine running and fully booted, select Devices in the virtual machine console.
     b. Select Install Guest Additions. This will launch the Oracle VM VirtualBox Guest Additions installer inside the virtual machine.

- Install Guest Additions with Auto-Logon:
    a. In the virtual machine console, load the Guest Additions by selecting Devices, CD/DVD Devices, then VBoxGuestAdditions.iso.
    b. With the virtual machine running and fully booted, go to the Windows Run console.
        - (Windows XP) In the Start menu, choose Run.
        - (Windows Vista and Windows 7) Search for 'run' in the Start search bar, and select it from the search results.
    c. Type the following and click OK to launch the Oracle VM VirtualBox Guest Additions installer inside the virtual machine.

```
D:\VBoxWindowsAdditions.exe /with_autologon
```

4. Install additional software, and optimize the desktop image.
   Refer to the Best Practices for Desktop Images for more information.

How to Create Virtual Machines (VMware vCenter)

Oracle Virtual Desktop Infrastructure presents users with easy access to their desktops, typically instances of Microsoft Windows XP executed in a virtual machine. You can manually create virtual machines, or you can configure the Oracle VDI Core to create or clone additional virtual machines automatically from a template.

Steps

1. Create a virtual machine with Microsoft Windows.
   Use your standard process for creating virtual machines. Refer to VMware Basic System Administration for more information about creating virtual machines.
   Follow these recommendations:
    - Use Microsoft Windows XP SP3 as the baseline. The license must be a volume license.
    - Define one disk. It should be as small as possible. The size impacts system performance and overall storage consumption. RAM also should be as small as possible.
        a. Windows Vista and Windows 7 - minimum of 1024 MB RAM and 5723 MB hard disk are recommended.
        b. Windows 2000 and Windows XP - minimum of 384 MB RAM and 4 GB hard disk are recommended.
    - A single CPU should be enough.
    - One network interface is needed. It should be configured for DHCP. Ensure that the virtual machine obtains a valid IP after powering on.

2. Install the VMware Tools.
   Once you have created a virtual machine with Microsoft Windows XP installed on it, install VMware Tools. VMware Tools is a suite of utilities that enhances the performance of the virtual machine's guest operating system and improves management of the virtual machine. Installing VMware Tools in the guest operating system is vital.
   The installation can be easily triggered from within the VMware Virtual Infrastructure Client (VIC): Right-click the virtual machine and choose Install VMware Tools. Refer to VMware Basic System Administration for more information about installing the VMware Tools.

3. Enable remote desktop access.
   RDP is the main access method to the Microsoft Windows XP desktop. By default, this access method is disabled and rejected through the firewall. To enable remote desktop access, launch VMware's Virtual Infrastructure Client, with your virtual machine still powered on and logged in, then follow these steps:
    a. Open a console for the virtual machine, and click the virtual machine's Start button.
    b. Right-click on My Computer in the start menu, and select Properties.
    c. In the System Properties window, select the Remote tab.
    d. Under Remote Desktop, select the box marked Enable Remote Desktop on This Computer.
    e. Make sure that the desired users have been granted remote access rights.
       Before you try to connect to a virtual desktop remotely, ensure that no firewall blocks the remote access. Make sure that port 3389 is enabled in any firewall that may be active on the system.

4. Install the VDI Tools.
   Oracle Virtual Desktop Infrastructure has a tools component that notifies the VDI service when a desktop is in use and

handles RDP connections when the guest OS initiates standby. The VDI Tools must be installed on the guest operating system for recycling to work correctly and so that the RDP connection is correctly closed when the virtual machine goes into standby or suspend mode. There are two versions of the VDI Tools: `vda-tools-x86.msi` for 32-bit platforms and `vda-tools-x64.msi` for 64-bit platforms.

a. Locate the correct installer file in the directory where you unzipped the Oracle VDI Core archive.
The `vda-tools-x86.msi` and `vda-tools-x64.msi` are located in the `./image/vda_3.1/Windows/Packages/` subdirectory. Copy the installer to the desired virtual machine.
b. Within the virtual machine's console, double-click the installer and follow the prompts to complete installation.
The default target location for the VDI Tools on Windows is `C:\Program Files\Oracle\Virtual Desktop Access\Tools`.
c. The VM Services list should now contain a new service named VDI Tools, running and set to start automatically.

5. Install additional software, and optimize the desktop image.
Refer to the Best Practices for Desktop Images for more information.

6. Convert a virtual machine into a template.
You can clone additional virtual machines manually, or let the Oracle VDI Core clone them automatically from a template. Any existing virtual machine can be converted into a template.
a. Open the Virtual Infrastructure Client.
b. Right-click the desired virtual machine and power down the machine.
c. From the commands area or the pop-up menu, click Convert to Template. Refer to VMware Basic System Administration for more information about templates.

7. Create a Customization Specification.
It is necessary to customize the identity and network settings of Windows XP after a clone has been created from a template. This can be achieved using a Customization Specification.
a. Open the Virtual Infrastructure Client.
b. Click Edit from the menu above the tool bar and select Customization Specifications.
c. Click the New icon in the Customization Specification Manager to start the wizard.
d. On the first wizard step, choose Windows as the target virtual machine OS, and give the specification a name and description.
e. The following steps ask the standard Windows installation questions and should be completed to correspond with your requirements, with the exception of the following.
- Computer Name: Make sure that the Use the Virtual Machine Name item is selected. If not, you may end up with duplicate hostnames.
- Windows License: Enter your Windows XP serial number. The Include Server License Information item should be left unchecked.
- Networking: Make sure the interface is configured for DHCP. If not, your cloned virtual machines will not have unique IP addresses and will not work with Oracle Virtual Desktop Infrastructure.

f. After completing the wizard and saving your customization specification, close the Customization Specification Manager.
Refer to VMware Basic System Administration for more information about Custom Specifications.

How to Create Virtual Machines (Microsoft Hyper-V)

Oracle VDI presents users with easy access to their virtual desktops, typically instances of Microsoft Windows XP executed in a virtual machine. You can manually create virtual machines, or you can configure Oracle VDI to create or clone additional virtual machines automatically from a template.

Steps

1. Create a virtual machine with Microsoft Windows.
Use your standard process for creating virtual machines. For information on how to create a virtual machine in Microsoft Hyper-V, refer to the Microsoft documentation.
Follow these recommendations:
- The license must be a volume license.
- Define one disk. It should be as small as possible. The size impacts system performance and overall storage consumption. RAM also should be as small as possible, for example, 384 MB.
    a. Windows Vista and Windows 7 - minimum of 1024 MB RAM and 5723 MB hard disk are recommended.
    b. Windows 2000 and Windows XP - minimum of 384 MB RAM and 4 GB hard disk are recommended.

2. Install the Microsoft Hyper-V Integration Components.

Once you have created a virtual machine with Microsoft Windows XP installed on it, install the Hyper-V Integration Components. The Integration Components allow Microsoft Hyper-V and Oracle VDI to interoperate with the virtual machine. Installing the Integration Components in the guest operating system is vital.
The installation can be easily triggered from within the Hyper-V Management Console: Connect to the virtual machine from the console and select the Insert Integration Services Setup Disk option from the Action menu.

3. Enable remote desktop access.
   RDP is the main access method to the Microsoft Windows XP desktop. By default, this access method is disabled and rejected through the firewall. To enable remote desktop access, connect to the virtual machine from the Hyper-V Management Console and follow these steps:
   a. In the console, click the virtual machine's Start button.
   b. Right-click on My Computer in the start menu, and select Properties.
   c. In the System Properties window, select the Remote tab.
   d. Under Remote Desktop, check the box marked Enable Remote Desktop on this computer so that this item is selected.
   e. Make sure that the desired users have been granted remote access rights.
   f. Click OK to save the settings and close the dialog.
      Before you try to connect to a virtual desktop remotely, ensure that no firewall blocks the remote access: Make sure that port 3389 is enabled in any firewall that may be active on the system.

4. Install the Oracle VDI Tools.
   Oracle VDI has a tools component that notifies the VDI service when a desktop is in use and handles RDP connections when the guest OS initiates Standby. The VDI Tools must be installed on the guest operating system for recycling to work correctly and so that the RDP connection is correctly closed when the virtual machine goes into Standby or Suspend mode.
   a. Locate the installer file, `vda-tools-x86.msi` for 32bit platforms or `vda-tools-x64.msi` for 64bit platforms, in the directory where you unzipped the VDI archive.
      The installer is located in the `vda_3.2.2/Windows/Packages` subdirectory. Copy the installer to the desired VM.
   b. Within the VM's console double-click the installer and follow the prompts to complete installation.
      The default target location for the VDI Tools on Windows is `C:\Program Files\Oracle\Virtual Desktop Access\Tools`.
   c. The VM services list should now contain a new service named Oracle VDI Tools, running and set to start automatically.

5. Install additional software, and optimize the desktop image.
   Refer to the Best Practices for Desktop Images for more information.

How to Import Desktops (Oracle VDI Hypervisor)

A pool is empty and has no desktops after initial creation. After you create virtual machines, you must import them into the Oracle VDI Core database.

Importing snapshots of virtual machines is not supported.

Before You Begin

A virtual machine must be created in the Oracle VM VirtualBox interface or using the integrated Oracle VDI Manager Flash console before it can be imported into the Oracle VDI Core database. Refer to the How to Create Virtual Machines (Oracle VDI Hypervisor) page for detailed information.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Select the Pools category, and then a pool.

3. Select the Desktops tab, and click Import.
   An import dialog will be displayed.

4. Select a desktop to be imported.
   - If the desktop you would like to import is on the Oracle VM VirtualBox host, select it from the Hypervisor tab, and click OK.
   - If the desktop you would like to import is available on the Oracle VDI Core host in `/var/tmp`, define the corresponding XML and VDI files under the Folder tab.
     The virtual machine will be imported as a background job.

After the desktop has been imported successfully, it will be displayed in the Desktop tab of the pool's profile.

You can move your virtual machine XML file and VDI image to `/var/tmp` using the following command:

```
# scp <path to file> root@<VDI host>:/var/tmp
```

If there is not enough space in `/var/tmp`, you can copy both files to another location on the host and create a symbolic link:

```
# ln -s <path to file> /var/tmp/
```

How to Import Desktops (VMware vCenter)

A pool is empty and has no desktops after initial creation. After you create virtual machines, you must import them so that the Oracle VDI Core can create a corresponding entry for the virtual machine in its database. The virtual machine will not be altered in any way.

Before You Begin

A virtual machine must be created in VMware vCenter before it can be imported into the Oracle VDI Core. Refer to the How to Create Virtual Machines (VMware vCenter) page for detailed information.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Open the Pools tab, then select the previously created pool.
3. Select the Desktops tab, and click Import.
   An import dialog is displayed showing the available virtual machines in the VMware vCenter hierarchy. You can select individual virtual machines or folders. If you select a folder, all the virtual machines in the folder will be selected for the import.
4. Click OK to import the desktops into the Oracle VDI Core database.

Desktops that are already imported into the Oracle VDI Core cannot be selected for import. You also cannot import templates.

After the desktops have been imported successfully, they will show up in the Desktops tab of the of the pool's profile (a page refresh might be necessary).

How to Import Desktops (Microsoft Hyper-V)

A pool is empty and has no desktops after initial creation. After you create virtual machines, you must import them into the Oracle VDI Core database.

⚠ Importing snapshots of virtual machines is not supported.

Before You Begin

A virtual machine must be created in Microsoft Hyper-V before it can be imported into the Oracle VDI Core database. Refer to the How to Create Virtual Machines (Microsoft Hyper-V) page for detailed information.

1. Export the virtual machine from the Hyper-V server.
    a. In the Hyper-V management console, select the Hyper-V virtual machine.
    b. Select Export from the Actions menu and choose a directory on the Hyper-V server to which you want to export the virtual machine.
    After the export has completed, you will have a directory containing a number of files and subdirectories. Copy the entire directory from the Hyper-V server to a directory on your VDI server or to a shared directory on a remote server (the shared directory must be accessible to the VDI server).

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
    a. Go to http://<server name>:1800 (or http://localhost:1800 if remote administration has been disabled), and use root user credentials. For a multi-host configuration, use one of the Oracle VDI Secondary hosts.
    b. You will be re-directed to https and the browser will ask you to accept the security certificate. After confirmation, you should get the login screen.

2. Import the desktop into the Oracle VDI Core.
    a. Open the Pools tab, then select the previously created empty pool.
    b. Select the Desktops tab, and click Import. An import dialog will be displayed.
    c. In the Server property, select the server you copied the Microsoft Hyper-V desktop directories to (if you copied them to your Oracle VDI Core server then choose the Host '<servername>' option otherwise if you copied them to a shared directory on a remote server then choose the Other Server option and enter the remote server name where the shared directory resides).
    d. In the Path property, enter the path to the directory that contains the Microsoft Hyper-V desktop directories.
    e. Select the correct desktop name from the Desktop dropdown, and click OK.

After the desktop has been imported successfully, it will display in the Desktops tab of the Pools page. A page refresh might be necessary.

How to Import Individual Windows PCs

Individual Windows PCs can be imported and managed with the Oracle VDI Manager as long as they allow remote connections. Importing an individual Windows PC consists of creating a Generic desktop provider, creating a new pool for the Generic desktop provider, and importing the Windows PC into the pool.

Before You Begin

Verify that the Windows PC is configured to allow remote connections by going to System Properties, then Remote Desktop.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Select the Desktop Providers category and click New in the Desktop Providers table.
   Create a Generic desktop provider.
3. Select the Pools category and click New in the Pools table.
   Choose the Generic desktop provider to host the pool.
4. Select the newly created pool from the Pools table.
5. Select the Desktop tab in the pool's profile. Then click Import.

How to Clone Desktops (Oracle VDI Hypervisor)

Cloning is the fastest and most efficient way to populate a pool. Use the steps below to enable cloning in a pool.

Before You Begin

A desktop must be imported before a template can be cloned. Refer to the How to Import Desktops (Oracle VDI Hypervisor) page for detailed information.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Enable cloning in a desktop pool.

    - To enable cloning in an existing pool:
        a. Select the Pools category, then select a pool.
        b. Select the Cloning tab, and select a template from the Template menu. For Oracle VDI and Microsoft Hyper-V desktop providers, all desktops will be cloned from the master revision of the selected template.
        c. To start cloning, check Enable Automatic Cloning and click Save.

    - To enable cloning in the New Pool wizard during pool creation:
        a. Choose the desktop template and select Enable Automatic Cloning.
        b. Click Finish to finalize the pool creation, and begin the automatic cloning.

Cloning can take up to a minute to start, after which you will see clone jobs begin to display in the Jobs window. To access the Jobs window, click the Jobs Running link in the top left of the Oracle VDI Manager. After a clone job has been finished successfully, the new desktop will be displayed in the Desktops tab of the pool's profile. A page refresh might be necessary.

CLI Steps

1. Open a terminal window and sign into the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

2. Start automatic cloning in a pool.

```
# /opt/SUNWvda/sbin/vda pool-start <pool name>
```

- Example – Starting automatic cloning in a pool

```
example% /opt/SUNWvda/sbin/vda pool-start MyPool
```

How to Clone Desktops (VMware vCenter)

Cloning is the fastest and most efficient way to populate a pool. Use the steps below to enable cloning in a pool.

Before You Begin

A virtual machine must be imported before a template can be cloned. Refer to the How to Import Desktops (VMware vCenter) page for detailed information.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Select the Pools category, then select a pool's Resources tab.

3. Select your preferred storage for newly cloned virtual machines.
   By default, all available storage may be used. For each clone, the Oracle VDI Core will select the storage with the most available disk space.

4. Select the Cloning tab.

5. Select the preferred template from the Template menu.
   The menu will list all templates that are available in the VMware vCenter.

6. Select Apply System Preparation, and specify which Customization Specification should be used.

7. Select Enable Automatic Cloning, and click Save to begin cloning.

Cloning can take up to a minute to start, after which you will see clone jobs begin to display in the Jobs window. To access the Jobs window, click the Jobs Running link in the top left of the Oracle VDI Manager. After a clone job has been finished successfully, the new desktop will display in the Desktops tab of the pool's profile. A page refresh might be necessary.

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

2. Start automatic cloning in a pool.

```
# /opt/SUNWvda/sbin/vda pool-start <pool name>
```

- Example – Starting automatic cloning in a pool

```
example% /opt/SUNWvda/sbin/vda pool-start MyPool
```

How to Clone Desktops (Microsoft Hyper-V)

Cloning is the fastest and most efficient way to populate a pool. Use the steps below to enable cloning in a pool.

Before You Begin

A virtual machine must be imported before a template can be cloned. Refer to the How to Import Desktops (Microsoft Hyper-V) page for detailed information.

VDI Manager Steps

1. Sign into the VDI Manager.
   a. Go to http://<server name>:1800 (or http://localhost:1800 if remote administration has been disabled), and use root user credentials. For a multi-host configuration, use one of the VDI Secondary hosts.
   b. You will be re-directed to https and the browser will ask you to accept the security certificate. After confirmation, you should get the login screen.

2. Enable cloning in a desktop pool.
   - If you would like to enable cloning in an existing pool, it can be done on the pool's Cloning tab.
     a. In the VDI Manager, open the Pools tab, then select the previously created pool.
     b. Select the Cloning tab, and specify the cloning parameters.
     c. At a minimum, define a desktop template to clone from, and select Enable Automatic Cloning.
   - Alternatively, you can enable cloning during pool creation in the New Pool wizard.
     a. Choose the desktop template and select Enable Automatic Cloning.
     b. Click Finish to finalize the pool creation, and begin the automatic cloning.

Cloning can take up to a minute to start, after which you will see clone jobs beginning to display in the Jobs window. To access the Jobs window, click the Jobs Running link in the top left of the VDI Manager. After a clone job has been finished successfully, the new desktop will display in the Desktops tab of the Pool page. A page refresh might be necessary.

CLI Steps

1. Open a terminal window and sign into the server with root credentials.
   For a multi-host configuration, use one of the VDI Secondary hosts.

2. Start automatic cloning in a pool.

```
# /opt/SUNWvda/sbin/vda pool-start <pool name>
```

- Example – Starting automatic cloning in a pool

```
example% /opt/SUNWvda/sbin/vda pool-start MyPool
```

About Template Management

Oracle VDI provides an Adobe Flash plug-in that enables you to easily access, test, and modify the desktop directly from within the Oracle VDI Manager. This feature also includes changing desktop properties as well as mounting ISO images for setting up the operating system.

Any desktop can be used as template for cloning additional desktops. Testing desktop templates and keeping track of any changes before rollout is crucial for large enterprise deployments. Oracle VDI now includes support for managing several template revisions. You can create a new template revision at any time, test your changes and declare the new revision as the master used for the cloning process. You can also revert to a previous revision if you are not satisfied with your changes.

About Clone Customization

Oracle VDI offers two methods to customize Windows desktops during the cloning process, Oracle VDI Fast Preparation and Microsoft System Preparation.

Oracle VDI Fast Preparation (FastPrep) is a replacement for Microsoft's system preparation tool that is available in an Active Directory environment. FastPrep changes the computer name of each clone, joins it to a domain, and can optionally execute a post-customization script. FastPrep is designed to reduce the clone time of each desktop.

Oracle VDI leverages the Microsoft System Preparation tool (Sysprep) for preparing Windows desktops for cloning. The use of Sysprep ensures that each desktop clone is assigned its own unique security identifier (SID), which is mandatory if desktops need to join an Active Directory domain. You can trigger Sysprep from within the Oracle VDI Manager. The corresponding template revision is automatically marked as Sysprepped once the preparation has completed.

How to Modify a Template in the VDI Manager

Template modification from the Oracle VDI Manager is available for Oracle VDI and Microsoft Hyper-V desktop pools. This functionality is especially useful for installation of additional software or operating system upgrades. For more about template and revision actions, refer to the About Templates and Revisions page.

Before You Begin

You will need to have created at a minimum a virtual machine in the interface of your chosen desktop provider (Oracle VDI, or Microsoft Hyper-V) before you can import it and use the template modification tools in the Oracle VDI Manager. Once you have created and imported the virtual machine, you can start it from the Oracle VDI Manager and carry out all the necessary preparation steps from there. For more information, see How to Create Virtual Machines (Oracle VDI Hypervisor) or How to Create Virtual Machines (Microsoft Hyper-V).

Oracle VDI Manager Steps

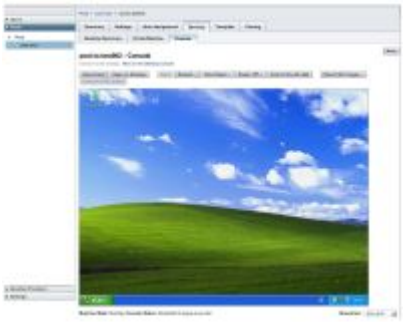
1. Sign into the Oracle VDI Manager.
    a. Go to http://<server name>:1800 (or http://localhost:1800 if remote administration has been disabled), and use root user credentials. For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.
    b. You will be re-directed to https and the browser will ask you to accept the security certificate. After confirmation, you should get the login screen.

2. Click the pool that you would like to populate with desktops, then select the Template tab.

3. Click the Import Template button to import the virtual machine you just created in the hypervisor interface.
   The virtual machine will be saved as Revision 1 as soon as it is imported.

4. Select the template you would like to modify, and click Start from the More Actions menu.
   No modifications can be performed until the virtual machine is started from the Oracle VDI Manager.

5. If necessary, make modifications to the template, such as installation of additional software or upgrades of the operating system.
    - Virtual machines hosted by Oracle VM VirtualBox can be modified from an interactive Adobe Flash console.

    - On Microsoft Hyper-V desktop providers, the modifications may take place on the desktop provider's Hyper-V host.

6. When you are finished modifying the template, select Shut Down from the More Actions menu.

How to Enable Oracle VDI Fast Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)

Windows desktops require customization for successful cloning by the Oracle VDI Core. Unlike Microsoft System Preparation, Fast Preparation (FastPrep) doesn't require any special preparation of the template prior to use.

Before You Begin

1. Prepare the template for Fast Preparation.
    a. If a post-customization script is required, the script should be copied to the template prior to cloning.
    b. Ensure that the template is not a member of a domain, it must be a member of a workgroup.

2. Import a virtual machine template in the Oracle VDI Manager.
   For more information, refer to one of the following pages:
    - How to Import Desktops (Sun VirtualBox)
    - How to Import Desktops (Microsoft Hyper-V)

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Prepare a pool to clone customized desktops based on Fast Preparation.
    a. Go to a pool's Cloning tab, or the Select Template screen of the New Pool wizard.
    b. Click Create next to System Preparation.
    c. Select the appropriate Fast Preparation option from the drop down for your template OS.
    d. The Create System Preparation File dialog will appear.
        - Windows Domain - The FQDN of the Windows domain. e.g. my.domain.com

- Domain Administrator - A domain administrator with permission to create a computer account and join the domain. This can optionally be prefixed with the domain, e.g. my.domain.com\Administrator
- Domain Administrator Password - The password the for the domain administrator
- Computer Container DN - The DN to place the new computer account in (e.g. OU=Accounting,OU=VDICenter,DC=my,DC=domain,DC=com). If left blank the default Computers container is used (ou=Computers,DC=my,DC=domain,DC=com).
- Read-only Domain Controller - From Windows 2008 Server, domain controllers (DC) can be configured as read-only for deployments in unsecured locations. For a computer to join a domain via a read-only DC the account must already exist and a special read-only flag is needed.
- Desktop Administrator - An administrator account on the template that has permissions to change the computer name, join a domain and optionally execute the custom script. For Windows Vista/7 the 'Administrator' account must be enabled and used.
- Desktop Administrator Password - The desktop administrator password
- Custom Script - An optional script that will be executed after customization has completed. This script can be a batch file or executable and must be located in a drive or folder accessible by the template and clones.

You are now ready to clone customized Windows desktops. Refer to the How to Clone Desktops (Sun VirtualBox) and How to Clone Desktops (Microsoft Hyper-V) pages.

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

2. Prepare a pool for sysprepped cloning.

```
# /opt/SUNWvda/sbin/vda pool-create-fastprep -p domain=<domain
FQDN>,domain-admin=<Domain Administrator>,domain-password=<Domain Administrator
Password>,admin=<Desktop Administrator>,admin-password=<Desktop Administrator
Password>,windows-release=<winxp or win7> -u <User Directory ID> <pool name>
```

How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)

Windows desktops require System Preparation for successful cloning by the Oracle VDI Core. After you create a Windows virtual machine, you should prepare it for Sysprep by downloading a Sysprep CAB (Windows XP only), and installing the Oracle VDI Tools (Hyper-V virtualization platforms only). Import the virtual machine into the Oracle VDI Core as a template, and select System Preparation on one of the template revisions. The Oracle VDI Core boots the revision, runs `Sysprep.exe`, and then shuts down the system. The revision now acts as a blank slate for cloning desktops in any pool with a valid System Preparation file.

A pool's System Preparation file defines licensing and credentials. If a pool has a valid System Preparation file, System Preparation is enabled, and cloning from the sysprepped template is enabled, all cloned desktops in the pool will have the customization defined by the System Preparation file.

One sysprepped revision can be used for multiple pools, and the System Preparation files can be changed and saved at any time from within the Oracle VDI Manager.

Due to a bug in Windows 7, the Windows Media Player Network Sharing Service causes the Windows Sysprep tool to hang. If you do not need this service enabled in your Windows 7 desktops and you intend to run System Preparation from the Oracle VDI Manager, stop and disable it. If you prefer to leave this service enabled, run Sysprep manually from within the template's Run console before importing it.

```
sysprep.exe -generalize -oobe -shutdown -quiet
```

Before You Begin

1. (Hyper-V Only) Install the Oracle VDI Tools on the template.
   The System Preparation action in the Template tab will not work if you do not have the tools (`vda-tools-x86.msi` for 32-bit platforms or `vda-tools-x64.msi` for 64-bit platforms) installed on your template. For Windows XP templates, you also need to have the Sysprep tools in a `C:\Sysprep` directory.

2. Prepare the template for System Preparation.
   - Windows 2000 and Windows XP
     a. Log into the template and download the appropriate Sysprep CAB for your version of Windows XP.
        - Windows 2000 Service Pack 4 Deployment Tools
        - Windows XP Service Pack 2 Deployment Tools
        - Windows XP Service Pack 3 Deployment Tools

     b. Create a directory on the template named `C:\Sysprep`.
     c. Unpack the contents of the Sysprep CAB into the `C:\Sysprep` directory.
   - Windows Vista and Windows 7
     No files need to be installed. Windows Vista and Windows 7 ship with all required system preparation files pre-installed.

3. Import a virtual machine template in the Oracle VDI Manager.
   For more information, refer to one of the following pages:
   - How to Import Desktops (Sun VirtualBox)
   - How to Import Desktops (Microsoft Hyper-V)

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Run System Preparation in a template revision.
   a. Click the Template tab, and select a revision.
   b. Choose System Preparation from the More Actions menu.
      This action will start a job, start the revision, run `Sysprep.exe`, and wait for the system to shut down.
   c. Wait for the job to complete successfully via the Job Summary pop-up. If the job fails for any reason, details of the failure can viewed in the Job Details text area by clicking on the failed job.
   d. Select the sysprepped revision and click Make Master.
      All pools currently using this template will clone new desktops from the sysprepped revision.

3. Prepare a pool to clone customized desktops based on a System Preparation file.
   a. Go to a pool's Cloning tab, or the Select Template screen of the New Pool wizard.
   b. Create a System Preparation file.
      The file requires a Windows administrator password, a Windows license key, and a Windows workgroup or a Windows domain, domain administrator, and administrator password.
   c. Select the sysprepped template, and select Apply System Preparation.
      You are now ready to clone customized Windows desktops. Refer to the How to Clone Desktops (Sun VirtualBox) and How to Clone Desktops (Microsoft Hyper-V) pages.

How to Search for Desktops

This task describes how to search for any desktop managed by the Oracle VDI Manager. The Desktop Search feature enables you to search for any desktop in any pool based on a set of predefined filters, or by using the search field.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Select Desktop Search in the Pools category.

3. Click a predefined filter link to display the list of desktops:
   - All desktops - The complete set of desktops from all existing pools.
   - Assigned desktops - All the desktops currently assigned to a user.
   - Running desktops - All the desktops currently up and running.
   - Desktops with error - All the desktops currently with errors, which can be due to a Defective State, or when the Machine State is Stuck, Aborted, Unresponsive or Unknown.

4. (Optional) Search the list of desktops by assigned user.

   Type a user name into the Desktop Search field and click Search to show only the currently listed desktops with the matching assigned user.

How to Create Automated Administration Scripts

The `/opt/SUNWvda/sbin/vda` CLI can be used in scripts for automated administration.

Reading the Return Code

The `/opt/SUNWvda/sbin/vda` returns the following exit codes:

- 0: Successful completion
- 1: An error occurred
- 2: Invalid command line options or arguments were specified

Waiting for a Job to Finish

Some `vda` subcommands return immediately but start an action in the background, a job.
The subcommand `job-wait` allows to synchronously wait for a specific job to be completed.

```
# /opt/SUNWvda/sbin/vda job-wait --help
Wait until the job ends

Usage:
 vda job-wait [-t <timeout> | --timeout=<timeout>] <job>
 -?, --help               Print this help list
Options:
 -t <timeout>, --timeout=<timeout>
                          Timeout in seconds to wait
Operand:
*<job>                    The id of the job
'*' denotes mandatory parameters.
```

Parsing the Output of the CLI

A number of subcommands support a parseable option so that the output is formatted for easy parsing: as a list of lines of colon-separated (':') fields.

The syntax of the option is:

```
  -x, --parseable         Display output suitable for programmatic parsing.
```

user-search

Search for users/groups in the user directory that match the specified search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Name of the user/group	string
Kind of object	`User` / `Group`
DN of the user/group	string

user-show

Show the desktops available for the user.

Parseable Output in the case of a user: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token <token>` / `Group <group_name>` / `Custom Group <group_name>`

Parseable Output in the case of a group: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

user-desktops

Show the desktops assigned to the user.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

group-list

Lists all custom groups.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Custom Group Name	string

group-show

Show the pools assigned to the custom group.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

token-search

Search for tokens that match the search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Token	string
Name of the Associated User	string
DN of the Associated User	string

token-show

Show the desktops available for the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token` / `Group <group_name>` / `Custom Group <group_name>`

token-desktops

Show the desktops assigned to the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

pool-list

List all pools.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Type of Desktop Assignment	`Personal` / `Flexible`
Number of Desktops	integer
Desktop Provider Name	string

pool-show

Show detailed information about the pool.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format

Assignment Status	`Enabled` / `Disabled`
Type of Desktop Assignment	`Personal` / `Flexible`
Desktop Provider Name	string
Cloning Status	`Enabled` / `Disabled`
Template	`None` / string
Number of Cloning Jobs	integer
Number of Available Desktops	integer
Number of Assigned Desktops	integer
Total Number of Desktops	integer
Guest Pool	`Enabled` / `Disabled`

pool-desktops

List all desktops from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Unknown`
Desktop State	`Available` / `Used` / `Idle` / `Unresponsive` / `Reserved` / etc.
DN of Assigned User	string

pool-templates

List all templates from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Aborted` / `Unknown`
Master Revision	string
Cloned Desktops	string

template-revisions

List the revisions of the template.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Revision Name	string
Revision ID	long

Creation Date	timestamp
Is It Master	yes / no
Cloned Desktops	string

provider-list

List all desktop providers.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Provider Name	string
Provider Type	`Sun VirtualBox` / `VMware vCenter` / `Microsoft Hyper-V` / `Microsoft Remote Desktop`
Total Number of Desktops	integer
Number of Used Desktops	integer
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Storage Usage	`xx% (x.x GB/MB)`

provider-list-hosts

List all hosts for the VirtualBox desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Status	OK / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Number of Desktops	integer

provider-list-storage

List all storage servers for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Status	OK / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
ZFS Pool	string
Capacity	`xxx.x GB`

Usage	xx.x GB
Number of Desktops	integer

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Storage ID	string
ZFS Pool	string
Capacity	xxx.x GB
Usage	xx.x GB
Number of Desktops	integer

provider-list-templates

List the templates for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	string
Path	string

provider-list-unmanaged

List the desktops from the virtualization platform that are not managed by any desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Desktop Name	string
Desktop ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	string

provider-list-networks

List all networks for the desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Subnet Label	String
Subnet Address	String
Availability	`All Hosts` / `Not on: <comma_separated_list_of_hosts>`

job-list

List the existing jobs.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
ID of the Job	integer
Cancellable	'C' if the job can be cancelled

job-show

Show the job details.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
Start Time	hh:mm:ss
End Time	hh:mm:ss
Job Details	string
Cancellable	`true` / `false`

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User Directory Management (All Topics)

About Companies

The Company feature, introduced in Oracle Virtual Desktop Infrastructure 3.2, enables several user directories to be configured for one Oracle Virtual Desktop Infrastructure environment. For example, this is useful for a business that provides 'Desktop as a Service' for separate customers.

To take advantage of the Company feature, you can create a company for each user directory. Virtualization resources (hosts and storage) are shared by all companies. Pools, desktops, users, groups, and tokens are separated for each company.

Templates are automatically separated for each company that use Oracle VDI or Microsoft Hyper-V desktop providers. For VMware vCenter desktop providers, all templates are visible to all pools. For security reasons, be sure that templates are only be used among pools of the same company.

For more information about how to create a Company in the Oracle VDI Manager, refer to the How to Create a Company page. For more information about user directory integration, refer to the About User Directory Integration page.

Changes to Desktop Selector

When you configure multiple companies, the user's interaction with the Desktop Selector changes. The privacy between the various companies involved is enforced, so the domain list menu is not shown in the Desktop Selector and users must input a username that identifies which company they belong to. The user can enter one of the following usernames based on the type of authentication configured:

- <userid>@<domainname> type syntax for Active Directory integration.
- <userid>@<companyname> type syntax for user directories that do not support domains.
- User's email address. (This requires that you must set the E-Mail Domain Name property for the Company.)

When a user gets a desktop from Oracle Virtual Desktop Infrastructure (via the desktop selector), the Oracle VDI Core passes the user credentials to the desktop so the user does not have to re-enter their credentials at the desktop login. One way Oracle Virtual Desktop Infrastructure enables users to authenticate is through their email address, however, an email address is not a valid username on the desktop side.

Before the Oracle VDI Core passes the credentials to the desktop, it tries to resolve the email address into a username@domain format by retrieving the user ID attribute and the user's default domain from the user directory. If using LDAP, the Oracle VDI Core cannot detect the default domain, so you need to set the `directory.default.domain` property using the `vda setting-setprops` command. If you don't set this property, users will have to authenticate again on the desktop side.

Corporation Setting

The Company feature also provides a Corporation setting. This setting is needed when you have a large number of users spread across multiple user directories (LDAP servers or Active Directory domains), but they are all part of the same "Corporation." For example, a company may have separate user directories per geographical location, such as Company-US and Company-Germany.

In this scenario, the privacy of company data is not required, so the domain list menu is shown in the Desktop Selector and it is populated with all the available domains from all the available companies.

You can enable the Corporation option from the Settings, Company page in the Oracle VDI Manager.

How to Create a Company

Most production environments keep user information stored in an Active Directory or LDAP server. Oracle Virtual Desktop Infrastructure can be configured to recognize existing user directories in the Oracle VDI Manager. Multiple user directories can be configured for one Oracle Virtual Desktop Infrastructure instance with the Company feature. For more information about the Company feature, refer to the About Companies page.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Select the Settings category in the left sidebar.
3. Select the Company subcategory, and click New in the Companies table to activate the New Company wizard.
4. Choose between Active Directory and LDAP user directory types. You can also choose 'none' if you only require token assignments.
    - If Active Directory type is chosen, some extra configuration on the Oracle VDI Core host is required before setting up Kerberos or Public Key certificates on the Oracle VDI Core.
    - LDAP type is more straightforward and may work with your Active Directory server depending on its configuration. LDAP integration offers three types of authentication: anonymous, simple, and secure.
      For more information about how to prepare the user directory, refer to the About User Directory Integration page.

About User Directory Integration

Typically user information is already stored in an Active Directory or LDAP server. Before you can assign users to desktops, you must configure the desired Active Directory/LDAP server and the Oracle VDI Core. The following information describes the user directory types supported by Oracle Virtual Desktop Infrastructure.

Active Directory Types

Active Directory integration is the recommended choice for production platforms integrating with Microsoft Active Directory.

Active Directory integration requires additional configuration (Kerberos configuration and time synchronization) on the Oracle VDI Core host. If you just want to quickly set up a demo with an Active Directory, it should be more straight-forward to use LDAP Types.
The users from the Active Directory can be used for desktop and pool assignments and will be able to access desktops provided by Oracle Virtual Desktop Infrastructure. On top of this basic feature, Active Directory integration offers the following functionalities:

1. Active Directory integration enables access all the users from a forest and makes those users available for desktop and pool assignments.
   This means that the users from the different sub-domains of the forest will be able to access desktops from Oracle Virtual Desktop Infrastructure.
2. Active Directory integration allows computer entries to be removed from the Active Directory when cloned desktops are deleted by the Oracle VDI Core.
   When a Windows desktop (cloned in the Oracle VDI Core) joins a domain through Sysprep, this will typically create a new computer entry in the Active Directory. Configuring the Oracle VDI Core with Kerberos Authentication will allow the Oracle VDI Core to remove the computer entries from the Active Directory, when deleting unused desktops. This avoids having computer entries piling up in the Active Directory while the matching desktops have long been destroyed.
3. Active Directory integration allows users to update their password in the Active Directory server either before this password has expired (optional action) or after the password has expired (mandatory action).

You can choose from the following supported Active Directory types:

- Kerberos Authentication - The typical choice when integrating with Microsoft Active Directory.
  See the How to Set Up Kerberos Authentication page for more information.

- Public Key Authentication - To be used to integrate with Microsoft Active Directory when the domain controller requires LDAP signing.
  See the How to Set Up Public Key Authentication page for more information.

LDAP Types

LDAP integration is the recommended choice for integrating with other types of LDAP directories or to quickly set up a demo with Active Directory. The setup is straight-forward, without the need for extra configuration.
If you need to install your own directory, you may choose OpenDS. Some directions to set it up for Oracle Virtual Desktop Infrastructure can be found here.

LDAP Integration allows users to update their password in the directory server only before this password has expired. If the user password expires, the user will be required to update it using a customer-provided process external to Oracle Virtual Desktop Infrastructure.

LDAP Integration offers three security types for authentication: anonymous, simple, and secure:

- Anonymous Authentication - Useful for a quick integration with an LDAP server for demo purposes. Anonymous Authentication may only be chosen if the LDAP server supports anonymous authentication. It is not recommended to select Anonymous Authentication on production platforms. Active Directory does not support Anonymous Authentication.
  See the How to Set Up Anonymous Authentication page for more information.

- Simple Authentication - The demo solution for Active Directory and the typical choice for other LDAP directories. Simple Authentication is the recommended choice for production platforms integrating with LDAP directories other than Active Directory. If integrating with Active Directory, it is not recommended to select Simple Authentication on production platforms as a better integration can be achieved using Kerberos Authentication. A default restriction in Active Directory prevents password update from an LDAP Simple Authentication.
  See the How to Set Up Simple Authentication page for more information.

- Secure Authentication - Useful to secure connections over SSL, when the directory supports it.
  See the How to Set Up Secure Authentication page for more information.

When a user gets a desktop from Oracle Virtual Desktop Infrastructure (via the desktop selector), the Oracle VDI Core passes the user credentials to the desktop so the user does not have to re-enter their credentials at the desktop login. One way Oracle Virtual Desktop Infrastructure enables users to authenticate is through their email address, however, an email address is not a valid username on the desktop side.

Before the Oracle VDI Core passes the credentials to the desktop, it tries to resolve the email address into a username@domain format by retrieving the user ID attribute and the user's default domain from the user directory. If using LDAP, the Oracle VDI Core cannot detect the default domain, so you need to set the `directory.default.domain` property using the `vda setting-setprops` command. If you don't set this property, users will have to authenticate again on the desktop side.

User Directory Customization

If you have an expert understanding of user directory integration and would like to optimize Oracle Virtual Desktop Infrastructure for your user directory, please refer to the following pages:

- About Internal Usage of the LDAP Filters and Attributes
- How to Edit the LDAP Filters and Attributes
- How to Reconfigure the User Directory Settings

How to Set Up Kerberos Authentication

Follow the steps below to configure Kerberos Authentication for your Active Directory.

To get the full functionality offered by Kerberos Authentication, it is necessary to provide the credentials of a user that has 'write' access to the Active Directory. This user will be used to read users and delete computer entries from the directory.

Steps

Kerberos Authentication requires some specific configuration on the Active Directory server and Oracle VDI Core host prior to setting up the user directory in the Oracle VDI Manager.

1. Kerberos authentication must be enabled in Active Directory.
   It should already be enabled as the default.

2. Ensure that each Active Directory forest has a global catalog server.
   Configure a domain controller in each forest as a global catalog server.

3. Set the Forest Functional Level.
   If the Domain Controller is running on Microsoft Windows Server 2008 R2, the Forest Functional Level must be set to Windows Server 2008 or Windows Server 2008 R2 (instead of the value used by default, Windows Server 2003). Refer to Microsoft documentation for more information about the Forest Functional Level.

4. Synchronize the time between the Oracle VDI Core server and Active Directory server.
   For example, use `ntpdate` <my.windows.host>

   If you have the Oracle VDI Core installed in a production environment, follow Kerberos's recommendation by using a time server. For demo Oracle Virtual Desktop Infrastructure installations, ensure that clocks are in sync as close as possible.

5. Edit the system default Kerberos configuration file (`/etc/krb5/krb5.conf` on Oracle Solaris OS platforms) on the Oracle VDI Core host.

The capitalization of the realm names in the Kerberos configuration file is very important so make sure you respect the capitalization as indicated in the example.

At a minimum, the Kerberos configuration file must contain the following sections:

- `[libdefaults]` - this sets defaults for Kerberos authentication. You must set the `default_realm`.
- `[realms]` - this sets the KDCs for each Kerberos realm. A realm can have more than one `kdc`, the port can omitted if the default port 88 is used.
  To allow end-users to update their password, the details of the server that handles the password change for each Kerberos realm must be specified. The `kpasswd_server` and `admin_server` entries identify the Kerberos administration server that handles the password change. If `kpasswd_server` is omitted, the `admin_server` is used instead. The port can be omitted if the default port 464 is used.
  Format of a realm definition:

```
<REALM_NAME> = {
kdc = <host:port>
kdc = <host:port>
...
kpasswd_server = <host:port>
admin_server = <host:port>
kpasswd_protocol = SET_CHANGE
}
```

- `[domain_realm]` - this maps Active Directory domains to Kerberos realms.
  The following is an example Kerberos configuration file for a forest with a single domain:

```
[libdefaults]
default_realm = MY.COMPANY.COM

[realms]
MY.COMPANY.COM = {
kdc = my.windows.host
admin_server = my.windows.host
kpasswd_protocol = SET_CHANGE
}

[domain_realm]
.my.company.com = MY.COMPANY.COM
my.company.com = MY.COMPANY.COM
```

6. You can check that Kerberos and its name resolution requirements are configured properly by using `getent`, `nslookup`, and `kinit`.
   For example:
   - `# getent hosts my.windows.host` must return the IP address and the hostname
   - `# getent hosts <IP_of_my.windows.host>` must return the IP address and the hostname
   - `# nslookup -query=any _gc._tcp.my.company.com` must resolve the domain
   - `# kinit -V super-user@MY.COMPANY.COM` must succeed

7. Restart the Common Agent Container.

```
cacaoadm stop --force
cacaoadm start
```

8. In the Oracle VDI Manager, go to the Settings category and User Directory subcategory, and click Add User Directory to launch the User Directory wizard.
   a. Select Active Directory Type, and click Next.
   b. Select Kerberos Authentication.
   c. Enter the domain for the Active Directory.

For example: `my.company.com`

d. Enter the user principal name of a user that has sufficient privileges to write into the Active Directory.
For example: `super-user` or `super-user@my.company.com`

e. Enter the password for that user.

f. Click Next to review your choices before completing the configuration.

More Information

> **Whitelist/Blacklist Support**
> Oracle Virtual Desktop Infrastructure 3.2.1 (and above) supports the Whitelist/Blacklist feature for Kerberos authentication. The feature is an optional set of hostname lists that can be specified for a Company, giving more fine-grained control over which Active Directory servers are queried by the Oracle VDI Core.
> The directory whitelist is a list of comma-separated Active Directory global catalog servers that are always used for LDAP queries. The order of the servers in the White List is important. If the Oracle VDI Core cannot contact the first server in the list, it tries the next one. The directory blacklist is a list of comma-separated Active Directory servers that are never used for LDAP queries. The blacklist settings override the whitelist settings. This feature can be enabled in the CLI only.

For more information about Kerberos and Solaris, refer to the following links.

- krb5.conf(4) man page - http://docs.sun.com/app/docs/doc/816-5174/krb5.conf-4?l=en&n=1&a=view
- Kerberos Service on Solaris 10 - http://docs.sun.com/app/docs/doc/816-4557/seamtm-1?l=en&a=view

How to Set Up Public Key Authentication

Public Key Authentication requires some specific configuration on the Active Directory server and the Oracle VDI Core host prior to setting up the user directory in the Oracle VDI Manager.

Steps

1. Follow the configuration steps 1 to 5 described for Kerberos Authentication.

2. Create a client certificate for each of the Oracle VDI Core hosts.
The Oracle VDI keystore for the client certificate is located at `/etc/opt/SUNWvda/sslkeystore` and the password is `changeit`.

   a. Generate a key pair (private/public key) for the client certificate.

      - On the Oracle VDI Core host, log in as superuser (root) and use `keytool` to generate the key pair in the Oracle VDI keystore.

```
/usr/java/jre/bin/keytool -genkey -keyalg rsa \
-keystore /etc/opt/SUNWvda/sslkeystore \
-storepass changeit -keypass changeit \
-alias <your_alias>
```

   b. Generate a Certificate Signing Request (CSR) for client certificate.

      - On the Oracle VDI Core host, use `keytool` to generate the certificate request.

```
/usr/java/jre/bin/keytool -certreq \
-keystore /etc/opt/SUNWvda/sslkeystore \
-storepass changeit -keypass  changeit \
-alias <your_alias> \
-file <certreq_file>
```

      The alias must be the same as the alias used when generating the key pair. Aliases are case-insensitive.

   c. Create the certificate.

      - Copy the CSR file to the server hosting the Active Directory.
      - Using Internet Explorer, go to "`http://localhost/certsrv`".
      - Log in.
      - On the Microsoft Certificate Services page, click Request a Certificate.

- On the Request a Certificate page, click Advanced Certificate Request.
- On the Advanced Certificate Request page, click Submit a Certificate Request by using a base-64-encoded CMC or PKCS #10 file, or submit a renewal request by using a base-64-encoded PKCS #7 file.
- On the Submit a Certificate Request or Renewal Request page, paste the contents of the CSR into the Saved Request text box or browse to the CSR file.
- Select an appropriate template from the Certificate Templates list. (Administrator is recommended).
- Click Submit.
- On the Certificate Issued page, ensure Base 64 Encoded is selected and click Download Certificate Chain .
- Save the certificate file.

d. Import the certificate on the Oracle VDI Core host.
- Copy the certificate file to the Oracle VDI Core host.
- Import the certificate into the Oracle VDI Core keystore.

```
/usr/java/jre/bin/keytool -import  \
-keystore /etc/opt/SUNWvda/sslkeystore \
-storepass changeit -keypass changeit \
-trustcacerts -file <certificate_file> \
-alias <your_alias>
```

3. Restart the Common Agent Container.

```
cacaoadm stop --force
cacaoadm start
```

4. Configure the user directory in Oracle VDI Manager.
   In the Oracle VDI Manager, go to the Settings category and User Directory subcategory, and click Add User Directory to launch the User Directory wizard:
   a. Select Active Directory Type, and click Next.
   b. Select Public Key Authentication.
   c. Enter the domain for the Active Directory.
      For example: `my.company.com`
   d. The following step shows the SSL certificates of the Active Directory servers. Click Next to permanently accept the certificates.
   e. Click Next to review your choices before completing the configuration.

How to Set Up Anonymous Authentication

Use the steps below to set up anonymous authentication.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Go to the Settings category and User Directory subcategory, and click Add User Directory to launch the User Directory wizard.
   a. Select LDAP Type, and click Next.
   b. Select Anonymous Authentication.
   c. Enter the hostname or IP address, and port number, of the LDAP server.
      The default port number, 389, is used by most LDAP servers.
   d. Enter the base DN of the LDAP server. Specifying a base DN is optional.*
      It allows you to restrict the part of the LDAP directory used to search for users.
      For example: `cn=Users,dc=my,dc=company,dc=com`

e. Click Next to review your choices before completing the configuration.
f. (Optional) If you want users to authenticate only once when logging in using their email address, set the default domain in the user directory.

```
/opt/SUNWvda/sbin/vda settings-setprops [-u <CompanyName>] -p
directory.default.domain=<domainname>
```

How to Set Up Simple Authentication

Use the steps below to set up simple authentication.

> It is necessary to provide the credentials of a user that has 'read' access to the user directory. This user will be used to read user information from the directory.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Go to the Settings category and User Directory subcategory, and click Add User Directory to launch the User Directory wizard.
   a. Select LDAP Type, and click Next.
   b. Select Simple Authentication.
   c. Enter the hostname or IP address, and port number, of the LDAP server.
      The default port number,389, is used by most LDAP servers.
   d. Enter the base DN of the LDAP server. Specifying a base DN is optional.
      It allows you to restrict the part of the LDAP directory used to search for users.
      For example: `cn=Users,dc=my,dc=company,dc=com`
   e. Enter the user name.
      It must be the fully distinguished name (DN) of a user that has sufficient privileges to search the LDAP directory.

      For example: `cn=super-user,cn=Users,dc=my,dc=company,dc=com`.
   f. Enter the password for the user.
   g. Click Next to review your choices before completing the configuration.
   h. (Optional) If you want users to authenticate only once when logging in using their email address, set the default domain in the user directory.

```
/opt/SUNWvda/sbin/vda settings-setprops [-u <CompanyName>] -p
directory.default.domain=<domainname>
```

How to Set Up Secure Authentication

Use the steps below to set up secure authentication.

> It is necessary to provide the credentials of a user that has 'read' access to the user directory. This user will be used to read user information from the directory.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Go to the Settings category and User Directory subcategory, and click Add User Directory to launch the User Directory wizard.

a. Select LDAP Type, and click Next.
b. Select Secure Authentication.
c. Enter the hostname or IP address, and port number, of the LDAP server.
   The default port, 636, is used by most SSL secured LDAP servers.
d. Enter the base DN of the LDAP server.
   Specifying a base DN is optional. It allows you to restrict the part of the LDAP directory used to search for users.
   For example: `cn=Users,dc=my,dc=company,dc=com`
e. Enter the user name.
   It must be the fully distinguished name (DN) of a user that has sufficient privileges to search the LDAP directory.
   For example: `cn=super-user,cn=Users,dc=my,dc=company,dc=com`.
f. Enter the password for the user.
g. The following step shows the SSL certificate of the LDAP server.
   Click Next to permanently accept the certificate.
h. Review your choices before completing the configuration.
i. (Optional) If you want users to authenticate only once when logging in using their email address, set the default domain in the user directory.

```
/opt/SUNWvda/sbin/vda settings-setprops [-u <CompanyName>] -p
directory.default.domain=<domainname>
```

About Global Oracle VDI Centers

Global Oracle VDI Center is a useful feature for companies with multiple geographically separated sites. In such an environment, it is likely that users travel from one site to another site and need access to their desktops in their home VDI Center. Global Oracle VDI Centers extend the basic "hotdesking" experience known from a single Oracle Virtual Desktop Infrastructure environment to encompass multiple Oracle Virtual Desktop Infrastructure environments.

Global Oracle VDI Centers assume the existence of a global user directory infrastructure. Global Oracle VDI Centers are always enabled but unless you have prepared your user directory, you cannot take advantage of this feature. For more information about how to prepare the user directory, refer to the How to Prepare a User Directory for Global Oracle VDI Centers page.

Oracle VDI Center – Home and Foreign

An Oracle VDI Center is an individual Oracle Virtual Desktop Infrastructure environment consisting of one or more Oracle VDI Core hosts. Users belong to one Oracle VDI Center at the geographical location they are normally working at, which is called their home Oracle VDI Center. When users are directly working on their home Oracle VDI Center, they will not notice any difference to a standalone Oracle VDI Center environment. If the user directory has been prepared accordingly and users are working from a foreign Oracle VDI Center, they have the possibility to switch to their home Oracle VDI Center or to get a desktop from one of the available Guest pools.

Guest Pools

A Guest pool is a pool with the "Guest" flag turned on and it provides desktops for users who have no assignments to desktops or other non-Guest pools on the Oracle VDI Center they are currently connecting to. A Guest pool is displayed in the desktop selector dialog only when a user meets this condition.

A pool can be set as a Guest pool using the Oracle VDI Manager or the CLI. Though they are not mandatory, the following are recommended settings for Guest pools:

- Flexible desktop assignment
- Small "Preferred Size" in order to not unnecessarily waste resources
- Small number of "Free Desktops" in order to not unnecessarily waste resources
- Large "Maximum Size" depending on how many guest users in the worst case are expected to work at the same time.

Oracle VDI Login and Desktop Selector Dialog

Initially after launching, the Oracle VDI Login Dialog looks the same as previous releases without Global Oracle VDI Centers. Once users provide a username and password, the system determines whether they are connecting to their current home or to a foreign Oracle VDI Center based on the Global Oracle VDI Center related data in the user directory. If no such data can be found for the current user, the current Oracle VDI Center is considered to be the user's home Oracle VDI Center.

If users connect to their home Oracle VDI Center, nothing changes from the user experience perspective compared to previous versions of Oracle Virtual Desktop Infrastructure. However, if users connect to a foreign Oracle VDI Center, the desktop selector dialog will contain several entries, for example:

1. One or multiple Guest pool entries, if such pools have been configured correctly by the administrator. The user can get a local desktop on the foreign Oracle VDI Center from these Guest pools. If the user has previously acquired a desktop from one of the configured Guest pools, the user will see this desktop in the desktop selector dialog instead of the Guest pools, because Guest pools are only visible in the desktop selector if a user has had no previous assignments to desktops or other non-Guest pools.
2. An entry enabling the user to switch to the user's home Oracle VDI Center.

If the user chooses to switch to the user's home Oracle VDI Center, the current session will be redirected to the user's home Oracle VDI Center. Once there, the user will see the Oracle VDI Login dialog again with the user name prepopulated, but the user has to provide a password again.

After successful authentication, the desktop selector dialog will be display showing the assigned desktops and pools of the user.

How to Prepare a User Directory for Global Oracle VDI Centers

Global Oracle VDI Centers have been designed to work out-of-the-box on the Oracle VDI Core side. However, the Oracle VDI Center data needs to be populated in your user directory according to the schema used by VDI.

If you want to use different attribute names and object types than the defaults, you may do so. You will then need to customize the LDAP filters and attributes used for Global Oracle VDI Centers to reflect the attributes and objects used in your schema.

See How to Edit the LDAP Filters and Attributes for the necessary steps and the default LDAP filters and attributes for Global Oracle VDI Centers.

Oracle VDI Center Data Schema

Oracle Virtual Desktop Infrastructure is configured to use the following schema for storing Oracle VDI Center data. This schema uses classes and attributes that already exist in LDAP v3 directories.

- Oracle VDI Center: an Oracle VDI Center is an Organization Unit (`ou`) object. It may be located in any place in the user directory. The name used to represent an Oracle VDI Center in the Oracle VDI desktop selector dialog is taken from the `displayName` attribute if this attribute is specified. Otherwise, the value of the `ou` attribute is used. An Oracle VDI Center `ou` contains (directly or through a hierarchy) several VDI Host objects, which are the Oracle VDI Core hosts composing the Oracle VDI Center.
- Oracle VDI Host: a VDI Host is a `computer` object (on Active Directory) or a `device` object (on other LDAP directories). The hostname/IP address of the VDI Host is taken from the `dNSHostName` attribute (on Active Directory) or the `ipHostNumber` attribute (on other LDAP directories). If none of there attributes are defined, the value of the `cn` attribute of the host object is used.
- Associating an Oracle VDI Center with a User: the Oracle VDI Center to which a user belongs is defined on the user object, in the `seeAlso` attribute. This value of this attribute needs to be the full DN of the Oracle VDI Center object for that user.

Example: In Active Directory

```
DC=my,DC=company,DC=com
- OU=VDI Centers
|--- OU=France
|    displayName=France Operational Center
|    objectClass=organizationalUnit
| |--- CN=France,VDI Host 1
| |    dNSHostName=vdi1.france.my.company.com
| |    objectClass=computer
| |
| |--- CN=France,VDI Host 2
|      dNSHostName=vdi2.france.my.company.com
|      objectClass=computer
|
|--- OU=Ireland
|    displayName=Ireland Operational Center
|    objectClass=organizationalUnit
| |--- CN=Ireland,VDI Host 1
|      dNSHostName=vdi1.ireland.my.company.com
|      objectClass=computer
|
|--- OU=Spain
|    displayName=Spain Operational Center
|    objectClass=organizationalUnit
| |--- CN=Spain,VDI Host 1
| |    dNSHostName=vdi1.spain.my.company.com
| |    objectClass=computer
| |
| |--- CN=Spain,VDI Host 2
|      dNSHostName=vdi2.spain.my.company.com
|      objectClass=computer
|
- CN=Users
|--- CN=Sean
|    objectClass=user
|    seeAlso=OU=Ireland,OU=VDI Centers,DC=my,DC=company,DC=com
|
|--- CN=Marie
|    objectClass=user
|    seeAlso=OU=France,OU=VDI Centers,DC=my,DC=company,DC=com
|
|--- CN=Carlos
     objectClass=user
     seeAlso=OU=Spain,OU=VDI Centers,DC=my,DC=company,DC=com
```

About Internal Usage of the LDAP Filters and Attributes

VDI uses various LDAP filters and attribute lists to look up and interpret the data stored in the user directory.

This sections explains how the LDAP filters and attributes are used by Oracle VDI to perform the different searches in the user directory necessary for each task.
See How to Edit the LDAP Filters and Attributes for details about how to edit those filters.

Searching for Users and Groups

You can use the administration tools (VDI Manager or CLI) to search for users and groups, in order to assign them to desktops or pools.

The search logic works as follow:

- Users are searched first:
  - the filter used to search for users is: (&<ldap.user.object.filter><ldap.user.search.filter>).
  - the $SEARCH_STRING placeholder is replaced by *criteria* where criteria is the string typed in the VDI Manager search field. If the criteria string already contains a wild-card *, then the $SEARCH_STRING placeholder is simply replaced by criteria.
- Groups are then searched as follow:

- the filter used to search for users is:
  (&<ldap.group.object.filter><ldap.group.search.filter>).
- the $SEARCH_STRING placeholder is replaced by *criteria* where criteria is the string typed in the VDI Manager search field. If the criteria string already contains a wild-card *, then the $SEARCH_STRING placeholder is simply replaced by criteria.

If the global setting ldap.search.wildcard is set to disabled, the $SEARCH_STRING placeholder is replaced by criteria (without being surounded by the wildcards). This restricts the returned results to strictly match the typed string but it is useful with very large and distributed user directories where the search using the wildcards takes too long to return.
Wildcards are added by default as the default value for ldap.search.wildcard is enabled.

Requesting a Desktop for a User

When requesting a desktop for a user, VDI first needs to find the user DN that matches the user ID before resolving the pool/desktop assignments for the user DN. If client authentication is enabled, then the user ID attribute is also used for authentication.

The attributes used to match the user ID are defined in ldap.userid.attributes.

Resolving Group Membership

Group membership is resolved using the attributes defined in ldap.user.member.attributes and ldap.group.member.attributes.
Nested group depth is limited to 3.

VDI also resolves Primary Group membership which is Active Directory specific. The attributes used for resolving primary group membership are defined in ldap.group.short.attributes and ldap.user.member.attributes.

LDAP Cache

In order to improve the performance and reduce the load on the user directory, the user and group entries retrieved by VDI are cached. Entries in the LDAP cache time out after 10 minutes.

It is not possible, at the moment, to change the LDAP cache timeout, nor to flush the cache.

How to Edit the LDAP Filters and Attributes

VDI uses various LDAP filters and attribute lists to look up and interpret the data stored in the user directory.

VDI comes with some default LDAP filters that are suitable for demos with Active Directory or Sun Directory Server. But these filters might be incompatible with other types of directories such as OpenLDAP or eDirectory and would then need to be modified.

For production, it is always recommended to customize those filters to match most closely the LDAP schema of the directory.

This section explains how to edit those filters, and the values recommended per type of directory.
See About Internal Usage of the LDAP Filters and Attributes for details about how Oracle VDI makes use of the different filters and attributes.

Before You Begin

The LDAP filters are specified as global settings using the vda command:

- /opt/SUNWvda/sbin/vda settings-getprops
- /opt/SUNWvda/sbin/vda settings-setprops

We recommend reviewing the command parameters before editing the LDAP filters.

The syntax of the LDAP filters and the validity of the LDAP attributes is not verified by Oracle VDI when you edit those values. So make sure you validate the LDAP filters and attributes before you set those values.

LDAP filters and attributes can be validated using an external LDAP tool such as `ldapsearch`.

CLI Steps

1. List the LDAP filter used to identify objects of type 'user' and the LDAP filter used to search for users according a search criteria:

```
example% /opt/SUNWvda/sbin/vda settings-getprops -p
ldap.user.object.filter,ldap.user.search.filter
ldap.user.object.filter:

(&(|(objectclass=user)(objectclass=person)(objectclass=inetOrgPerson)(objectclass=o
(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING)(mail=$SEARCH_STRING))
```

2. Customize the LDAP filter used to search for users according a search criteria, for Active Directory:

```
example% /opt/SUNWvda/sbin/vda settings-setprops -p
ldap.user.search.filter='"(|(cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING)(mail=\$SEARCH_
updated.

example% /opt/SUNWvda/sbin/vda settings-getprops -p ldap.user.search.filter
ldap.user.search.filter:

(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING)(mail=$SEARCH_STRING))
```

Default LDAP Filters and Attributes

Global Setting Name	Description	Default Value
`ldap.user.object.filter`	LDAP filter used to identify objects of type user	`(&(|(objectclass=user)(objectclass=person)(object (objectclass=organizationalPerson))(!(objectclass`
`ldap.user.search.filter`	LDAP filter used to search for users according a search criteria. Searches for users can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING) (userPrincipalName=$SEARCH_STRING)(mail=$SEARCH_S`

ldap.userid.attributes	List of comma separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid	uid,sAMAccountName,userPrincipalName,mail
ldap.user.member.attributes	List of comma separated LDAP attributes on a user object storing the groups the user is a member of	memberof,primaryGroupID
ldap.group.object.filter	LDAP filter used to identify objects of type group	(|(objectclass=group)(objectclass=groupofnames)(c
ldap.group.search.filter	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	(|(dc=$SEARCH_STRING)(o=$SEARCH_STRING)(ou=$SEARC (cn=$SEARCH_STRING)(uid=$SEARCH_STRING)(mail=$SEA
ldap.group.member.attributes	List of comma separated LDAP attributes on a group object storing the users member of the group	member,uniquemember
ldap.group.short.attributes	List of comma separated LDAP attributes on a group object storing the information for primary group membership. Primary group membership is specific to Active Directory.	primaryGroupToken

`ldap.container.object.filter`	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console	`(|(objectclass=domain)(objectclass=organization)(objectclass=organizationalUnit)(objectclass=cont`
`ldap.container.search.filter`	LDAP filter used by the web administration console to search for containers according a search criteria, when selecting a root for a custom group filter. $SEARCH_STRING is the place holder for the search criteria	`(|(cn=$SEARCH_STRING)(dc=$SEARCH_STRING)(ou=$SEAR`
`ldap.default.attributes`	List of comma separated LDAP attributes loaded in the cache when looking up an object. It should contain all the attributes used in the other filters and attribute lists.	`dc,o,ou,cn,uid,mail,member,uniquemember,memberof,sAMAccountName,primaryGroupToken,primaryGroupID`

Default LDAP Filters and Attributes for Global Oracle VDI Centers

Oracle Virtual Desktop Infrastructure uses the following LDAP filters and attributes to interpret the Oracle VDI Center data stored in the user directory.

The default values are intended for compatibility with Active Directory and Sun DS. It is recommended to edit the default values in order to use the more specific ones for your type of directory.

If you choose to use different objects and attributes than the defaults to store the Oracle VDI Center data, you will have to adapt the LDAP filters and attributes accordingly.

See How to Prepare a User Directory for Global Oracle VDI Centers for a detailed example.

Setting Name	Description	Default value
`ldap.vdicenter.displayname.attributes`	list of attributes on a VDI center object that contains display name	`displayName,ou`

ldap.vdihost.object.filter	filter to match a VDI host object	(|(objectClass=computer)(objectClass=device)
ldap.vdihost.dnsname.attributes	list of attributes on a VDI host object that contains the DNS name or IP address of the host	dNSHostName,ipHostNumber,cn
ldap.user.vdicenter.attributes	list of attributes on a user object that contains the VDI center DN	seeAlso

Recommended Values with Active Directory

Global Setting Name	Description	Recommended Value with Active Directory
ldap.user.object.filter	LDAP filter used to identify objects of type user	(&(objectclass=user)(!(objectclass=computer)))
ldap.user.search.filter	LDAP filter used to search for users according a search criteria. Searches for users can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	(|(cn=$SEARCH_STRING)(sAMAccountName=$SEARCH_STRI
ldap.userid.attributes	List of comma separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid	sAMAccountName

`ldap.user.member.attributes`	List of comma separated LDAP attributes on a user object storing the groups the user is a member of	`memberof,primaryGroupID`
`ldap.group.object.filter`	LDAP filter used to identify objects of type group	`(objectclass=group)`
`ldap.group.search.filter`	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(cn=$SEARCH_STRING)`
`ldap.group.member.attributes`	List of comma separated LDAP attributes on a group object storing the users member of the group	`member`
`ldap.group.short.attributes`	List of comma separated LDAP attributes on a group object storing the information for primary group membership. Primary group membership is specific to Active Directory.	`primaryGroupToken`
`ldap.container.object.filter`	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console	`(objectclass=container)`

`ldap.container.search.filter`	LDAP filter used by the web administration console to search for containers according a search criteria, when selecting a root for a custom group filter. $SEARCH_STRING is the place holder for the search criteria	`(cn=$SEARCH_STRING)`
`ldap.default.attributes`	List of comma separated LDAP attributes loaded in the cache when looking up an object. It should contain all the attributes used in the other filters and attribute lists.	`cn,member,memberof,sAMAccountName,primaryGroupTo`

If you use the `userPrincipalName` or `mail` attribute for user identification, include 'userPrincipalName' or 'mail' respectively in the above values wherever the entries for 'sAMAccountName' are present.

Recommended Values with Sun Directory Server

Global Setting Name	Description	Recommended Value with Sun Directory Server
`ldap.user.object.filter`	LDAP filter used to identify objects of type user	`(objectclass=person)`
`ldap.user.search.filter`	LDAP filter used to search for users according a search criteria. Searches for users can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING))`

`ldap.userid.attributes`	List of comma separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid	`uid`
`ldap.user.member.attributes`	List of comma separated LDAP attributes on a user object storing the groups the user is a member of	`memberof`
`ldap.group.object.filter`	LDAP filter used to identify objects of type group	`(objectclass=groupofuniquenames)`
`ldap.group.search.filter`	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(cn=$SEARCH_STRING)`
`ldap.group.member.attributes`	List of comma separated LDAP attributes on a group object storing the users member of the group	`uniquemember`
`ldap.group.short.attributes`	List of comma separated LDAP attributes on a group object storing the information for primary group membership. Primary group membership is specific to Active Directory.	empty

ldap.container.object.filter	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console	(|(objectclass=domain)(objectclass=organizational
ldap.container.search.filter	LDAP filter used by the web administration console to search for containers according a search criteria, when selecting a root for a custom group filter. $SEARCH_STRING is the place holder for the search criteria	(|(dc=$SEARCH_STRING)(ou=$SEARCH_STRING))
ldap.default.attributes	List of comma separated LDAP attributes loaded in the cache when looking up an object. It should contain all the attributes used in the other filters and attribute lists.	dc,ou,cn,uid,uniquemember,memberof

Recommended Values with OpenDS

Global Setting Name	Description	Recommended Value with OpenDS
ldap.user.object.filter	LDAP filter used to identify objects of type user	(objectclass=person)
ldap.user.search.filter	LDAP filter used to search for users according a search criteria. Searches for users can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING))

`ldap.userid.attributes`	List of comma separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid	`uid`
`ldap.user.member.attributes`	List of comma separated LDAP attributes on a user object storing the groups the user is a member of	`memberof`
`ldap.group.object.filter`	LDAP filter used to identify objects of type group	`(objectclass=groupofuniquenames)`
`ldap.group.search.filter`	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(cn=$SEARCH_STRING)`
`ldap.group.member.attributes`	List of comma separated LDAP attributes on a group object storing the users member of the group	`uniquemember`
`ldap.group.short.attributes`	List of comma separated LDAP attributes on a group object storing the information for primary group membership. Primary group membership is specific to Active Directory.	empty

`ldap.container.object.filter`	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console	`(|(objectclass=domain)(objectclass=organizational`
`ldap.container.search.filter`	LDAP filter used by the web administration console to search for containers according a search criteria, when selecting a root for a custom group filter. $SEARCH_STRING is the place holder for the search criteria	`(|(dc=$SEARCH_STRING)(ou=$SEARCH_STRING))`
`ldap.default.attributes`	List of comma separated LDAP attributes loaded in the cache when looking up an object. It should contain all the attributes used in the other filters and attribute lists.	`dc,ou,cn,uid,uniquemember,memberof`

Recommended Values with Open LDAP

Global Setting Name	Description	Recommended Value with Open LDAP
`ldap.user.object.filter`	LDAP filter used to identify objects of type user	It is mandatory to remove `(!(objectclass=computer))` from the default filter. Recommended is `(objectclass=person)`
`ldap.user.search.filter`	LDAP filter used to search for users according a search criteria. Searches for users can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING))`
`ldap.userid.attributes`	List of comma separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid	`uid`

ldap.user.member.attributes	List of comma separated LDAP attributes on a user object storing the groups the user is a member of	memberof
ldap.group.object.filter	LDAP filter used to identify objects of type group	(objectclass=groupofnames)
ldap.group.search.filter	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	(cn=$SEARCH_STRING)
ldap.group.member.attributes	List of comma separated LDAP attributes on a group object storing the users member of the group	member
ldap.group.short.attributes	List of comma separated LDAP attributes on a group object storing the information for primary group membership. Primary group membership is specific to Active Directory.	empty
ldap.container.object.filter	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console	???
ldap.container.search.filter	LDAP filter used by the web administration console to search for containers according a search criteria, when selecting a root for a custom group filter. $SEARCH_STRING is the place holder for the search criteria	???
ldap.default.attributes	List of comma separated LDAP attributes loaded in the cache when looking up an object. It should contain all the attributes used in the other filters and attribute lists.	cn,uid,member,memberof

Recommended Values with Novell eDirectory

Global Setting Name	Description	Recommended Value with Novell eDirectory
`ldap.user.object.filter`	LDAP filter used to identify objects of type user	It is mandatory to remove `(!(objectclass=computer))` from `(objectclass=person)`
`ldap.user.search.filter`	LDAP filter used to search for users according a search criteria. Searches for users can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	`(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING)(givenNa`
`ldap.userid.attributes`	List of comma separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid	`givenName,cn,uid`
`ldap.user.member.attributes`	List of comma separated LDAP attributes on a user object storing the groups the user is a member of	`groupMembership`
`ldap.group.object.filter`	LDAP filter used to identify objects of type group	`(|(objectclass=group)(objectclass=groupofnames)(o`
`ldap.group.search.filter`	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the user-search command or in the web administration console. $SEARCH_STRING is the place holder for the search criteria	???

`ldap.group.member.attributes`	List of comma separated LDAP attributes on a group object storing the users member of the group	`member,uniquemember`
`ldap.group.short.attributes`	List of comma separated LDAP attributes on a group object storing the information for primary group membership. Primary group membership is specific to Active Directory.	empty
`ldap.container.object.filter`	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console	`(objectclass=organizationalUnit)`
`ldap.container.search.filter`	LDAP filter used by the web administration console to search for containers according a search criteria, when selecting a root for a custom group filter. $SEARCH_STRING is the place holder for the search criteria	???
`ldap.default.attributes`	List of comma separated LDAP attributes loaded in the cache when looking up an object. It should contain all the attributes used in the other filters and attribute lists.	`cn,uid,givenName,groupmembership,member,uniquemem`

How to Reconfigure the User Directory Settings

User directory settings are configured in the Admin Web UI in the Settings category and Company subcategory.

Defining the User Directory

The instructions to define the user directory are described in About User Directory Integration.

Changing the Security Level

It is possible to change the security level for the connections to a user directory:

1. Go to the LDAP or Active Directory tab (depending on the user directory type).
2. Click Edit for the Security Level to launch the wizard.
3. Switch to another security level and modify the other settings if necessary, such as the port, the username, and the password.
4. Click Next to review your choices before completing the configuration update.

It is only possible to switch to a security level within the same type of user directory, LDAP or Active Directory. If you want to switch between LDAP and Active Directory, you have to remove the user directory and add it again.

In the case of LDAP connection type, it is not possible change the security level if additional hosts have been defined (see Adding Fallback Hosts).

Changing the Credentials

When using Kerberos, Simple or Secure authentication, it is possible to update the credentials used for opening the connection to a user directory:

1. Go to the LDAP or Active Directory tab (depending on the user directory type).
2. Click Edit for the Security Level to launch the wizard.
3. Edit the username and the password as necessary.
4. Click Next to review your choices before completing the configuration update.

Updating the Server SSL Certificates

When using Public Key or Secure authentication, if the SSL certificate for the server has been changed, you need VDI to use the new certificate:

1. Go to the LDAP or Active Directory tab (depending on the user directory type).
2. Click Edit for the Security Level to launch the wizard.
   Do not change any of the existing settings if you only want to update the server certificates. One of the wizard steps shows the SSL certificates of the servers. Click Next to permanently accept the certificates.
3. Click Next to review your choices before completing the configuration update.

Adding Fallback Hosts

When using the LDAP type of connection, it is possible to have additional LDAP hosts that would be used as a fallback in the case the connection to the main host is failing.

The additional LDAP hosts must be the replica of the main host. The connection to the fallback hosts will be open using the same security level, same port, same base DN and same credentials as for the main host.

The list of LDAP hosts can be found in the LDAP tab. Hosts can be added, removed and their order can be changed.

Removing a Company

You can remove a company through the *All Companies* page in the Oracle VDI Manager.

If some assignments were registered using data (users or groups) from the user directory, a warning is displayed and you are asked to confirm the removal. If you confirm, the company and all user directory assignment data are removed.

About Complex Forest Configurations

The following types of Active Directory forest configurations are supported by Oracle Virtual Desktop Infrastructure.

- Single domain forests (supported in Oracle Virtual Desktop Infrastructure 3.1 or greater)

- Single tree forests with multiple domains (supported in Oracle Virtual Desktop Infrastructure 3.1 or greater)
- Multiple tree forests with multiple domains with or without child domains (supported in Oracle Virtual Desktop Infrastructure 3.2)

Multiple tree forests are supported in Oracle Virtual Desktop Infrastructure 3.2.1 and above.

For example, the following multiple tree configuration with multiple domains is supported.

- One tree containing the domain `central.vdi.oracle.com` (Forest Root) and a child domain `child.central.vdi.oracle.com`
- A second tree containing the domain `east.vdi.oracle.com`
- Both trees are part of the same forest (central.vdi.oracle.com)

In order to add this tree configuration as a Company in the Oracle VDI Manager, first make sure that Kerberos has been configured correctly on the Oracle VDI Core hosts. Refer to the How to Set Up Kerberos Authentication page for more information.

The `/etc/krb5/krb5.conf` file should look similar to the following.

```
[libdefaults]
default_checksum = rsa-md5

[realms]
CENTRAL.VDI.ORACLE.COM = {
   kdc = centralroot.vdi.oracle.com
}
CHILD.CENTRAL.VDI.ORACLE.COM = {
   kdc = centralchild.vdi.oracle.com
}
EAST.VDI.ORACLE.COM = {
   kdc = eastroot.vdi.oracle.com
}

[domain_realm]
.central.vdi.oracle.com = CENTRAL.VDI.ORACLE.COM
 central.vdi.oracle.com = CENTRAL.VDI.ORACLE.COM
.child.central.vdi.oracle.com = CHILD.CENTRAL.VDI.ORACLE.COM
 child.central.vdi.oracle.com = CHILD.CENTRAL.VDI.ORACLE.COM
.east.vdi.oracle.com = EAST.VDI.ORACLE.COM
 east.vdi.oracle.com = EAST.VDI.ORACLE.COM
```

In the Oracle VDI Manager New Company wizard, be sure to enter the domain name of the Forest Root in the Specify Connection step.

Contents

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- How to Create Custom Groups and Custom Group Filters
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Token and User Management (All Topics)

How to Assign Users to Pools or Desktops

You can either assign a user to a specific desktop, or you can assign a user (or user group) to a desktop pool. If a user is assigned to a pool and requests a desktop, the Oracle VDI Core will automatically deliver any available desktop from the pool.

For Microsoft Remote Desktop providers, users cannot be directly assigned to desktops. Instead, users or groups are assigned to Remote Desktop Services pools.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Select a Company in the Users category.
   - To assign a user or a group, select the Users and Groups tab in the Company's profile.
     a. Search for users and groups in the user directory.
        You can specify user name or user ID.
     b. Click on the user name, and click the Assignment tab in their profile.
     c. Select Add in the Assigned Desktops or Assigned Pools table, depending on your preference.
   - To assign a custom group, select the Custom Groups tab in the Company's profile.
     a. Click the Assignment tab in the custom group's profile.
     b. In the Assigned Pools table, select Add.

3. Select the checkbox for the desktop or pool assignment, and click OK.

You can always see which pools and desktops are associated with a user by clicking the Summary tab of the user or group's profile.

How to Create Custom Groups and Custom Group Filters

Oracle VDI user directory integration not only recognizes existing groups, but also allows you to make custom groups, and assign them to a pool. If you want to define a set of users that is not an existing group in the user directory, you can create a custom group, and specify the filter to search in the user directory. This functionality allows you to define VDI user groups locally without the need for any changes in your Active Directory or LDAP user directory.

VDI Manager Steps

To create a custom group:

1. Select the Users category, and the Custom Groups subcategory in the left sidebar.
2. Select New in the Custom Groups overview.
3. Give the Custom Group a descriptive name, and click OK.

To define a custom group filter:

1. Click the Filter tab, and choose a Filter Mode:
   The default filter mode is Composition. You can create a custom filter by choosing an Attribute, Relationship, and Value. You can also use the Advanced filter mode, which uses LDAP search syntax defined by RFC 2254 LDAP documentation. For more information, see http://www.ietf.org/rfc/rfc2254.txt.
2. Before saving, click Preview to see how the filter configuration will behave. If the filter defines the target group of users, click Save.

How to Assign Tokens to Users

In a Sun Ray environment, users may take advantage of smart cards (tokens) to initiate a session on a Sun Ray Thin Client (DTU). With Oracle Virtual Desktop Infrastructure, you can assign a token to a user. It is also possible to assign desktops directly to specific tokens. Once tokens have been created, they can be assigned to pools and desktops.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Select a Company in the Users category, and the Users and Groups tab in the Company's profile.
3. Search for a user in the user directory.
4. Click on the user name, and click the Token tab in their profile.
5. Assign the token.
   - If you are assigning a new token, click New in the Tokens table. Then Enter the ID of the new token (e.g. Payflex.500d9b8900130200).
   - If you are assigning an existing token, select Add in the Tokens table. Then search for the desired token.

Token IDs can be copied directly from the SRSS Admin GUI (see the Tokens tab and display Currently Used Tokens).

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.
2. Assign a token.
   - Assign a new token to a user.

```
# /opt/SUNWvda/sbin/vda token-create -p token-id=<token ID>,user=<user ID>
```

   - Example – Creating a new token and assigning it to a user

```
# /opt/SUNWvda/sbin/vda token-create -p
token-id=Payflex.600a7c5600130200,user=jd123456
Token Payflex.600a7c5600130200 created
```

   - Assign an existing token to a user.

```
# /opt/SUNWvda/sbin/vda token-create -p token-id=<token ID>,user=<user ID>
```

   - Example – Assigning an existing token to a user

```
# /opt/SUNWvda/sbin/vda token-setprops -p user=jd123456
Payflex.600a7c5600130200
Token properties updated
```

How to Assign Tokens to Desktops or Pools

You can assign tokens to desktops or desktop pools. This is similar to assigning desktops to users, however, a single user can potentially own multiple tokens (smart cards). By assigning tokens to desktops, users are able to easily switch between the assigned desktops by just inserting different smart cards into the Thin Client.

Assigning desktops or pools to each token individually can be cumbersome. To ease this process, Oracle Virtual Desktop

Infrastructure provides some predefined special tokens ("AnySmartCard.000" and "AnySunRayClient.000"), which can be used to make default pool assignments in a single company setup.

For example, if you assign a pool to the AnySmartCard.000 token, any user taking advantage of a smart card (regardless of the smart card ID) will get a desktop from this pool. Or, if you assign a pool to the AnySunRayClient.000 token, any user using a Sun Ray client (Sun Ray Thin Clients and Oracle Virtual Desktop Clients) without a smart card will get a desktop from this pool.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.
2. Select the Users tab and Tokens entry in the left sidebar.
3. Select a token from the Tokens table.
4. Assign the token.
   - If you are assigning a token to a desktop, click Add on the Assigned Desktops table. Then enter the ID of the token (e.g. Payflex.500d9b8900130200).
   - If you are assigning a token to a pool, click Add on the Assigned Pool table. Then enter the ID of the token (e.g. Payflex.500d9b8900130200).

> Token IDs can be copied directly from the SRSS Admin GUI (see the Tokens tab and display Currently Used Tokens).

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

   - Assign a token to a desktop.
     a. List available desktops.

```
# /opt/SUNWvda/sbin/vda pool-desktops <pool name>
```

     b. Assign the token to one of the listed desktops.

```
# /opt/SUNWvda/sbin/vda token-assign --desktop=<desktop ID> <token
ID>
```

   - Example – Assigning an existing token to a desktop

```
# /opt/SUNWvda/sbin/vda pool-desktops "Sales - EMEA"
NAME                          ID  MACHINE_STATE        STATUS
DN
OpenSolaris 2008.11 De 2
                               2    Powered Off     Available
-

# /opt/SUNWvda/sbin/vda token-assign --desktop=2
Payflex.500d9b8900130200
Token Payflex.500d9b8900130200 assigned to desktop 2
```

or

- Assign a token to a pool.

```
# /opt/SUNWvda/sbin/vda token-assign --pool=<pool name> <token ID>
```

- Example – Assigning an existing token to a pool

```
# /opt/SUNWvda/sbin/vda token-assign --pool="Sales - EMEA"
Payflex.500d9b8900130200
```

- Example – Assigning all smart cards to a pool

```
# /opt/SUNWvda/sbin/vda token-assign --pool="Sales - EMEA"
AnySmartCard.000
```

How to Create Bulks of Tokens

It is possible to create a number of tokens at once using the token-create subcommand.

The `token-create` subcommand can take an input file containing the tokens to create and the user associated with the token if needed.

Usage

```
Options:
-f <token-file>, --file=<token-file>
A CSV file containing the properties of the tokens to
be created. Format of the file is: <token-id> <comment>
<userid>
-w, --write Overwrite existing tokens, option to be used with the
token-file option
```

The format of the token file is CSV with the following values:

- token-id: the id of the smart card, this value is mandatory.
- comment: a comment about the token that can be used as a user friendly description of the token. This value maybe empty.
- userid: the user id of a user from the user directory, to be associated with the token. This value maybe empty.

Example

The following example shows a valid csv file for token creation and uses the file to create the tokens and their association to users.

```
example% cat /tokens.csv
mo12.345,"token for Mary O'Leary",moleary
js46.23,"token for user John Smith",jsmith
x34.45,"token without any associated user",
example% /opt/SUNWvda/sbin/vda token-create -f /tokens.csv
example% /opt/SUNWvda/sbin/vda token-search
NAME USER DN
mo12.345 Mary O'Leary cn=Mary O'Leary,ou=people
js46.23 John Smith cn=John Smith,ou=people
x34.45 - -
```

How to Create Automated Administration Scripts

The `/opt/SUNWvda/sbin/vda` CLI can be used in scripts for automated administration.

Reading the Return Code

The `/opt/SUNWvda/sbin/vda` returns the following exit codes:

- 0: Successful completion
- 1: An error occurred
- 2: Invalid command line options or arguments were specified

Waiting for a Job to Finish

Some `vda` subcommands return immediately but start an action in the background, a job.
The subcommand `job-wait` allows to synchronously wait for a specific job to be completed.

```
# /opt/SUNWvda/sbin/vda job-wait --help
Wait until the job ends

Usage:
 vda job-wait [-t <timeout> | --timeout=<timeout>] <job>
 -?, --help               Print this help list
Options:
 -t <timeout>, --timeout=<timeout>
                          Timeout in seconds to wait
Operand:
*<job>                    The id of the job
'*' denotes mandatory parameters.
```

Parsing the Output of the CLI

A number of subcommands support a parseable option so that the output is formatted for easy parsing: as a list of lines of colon-separated (':') fields.

The syntax of the option is:

```
 -x, --parseable         Display output suitable for programmatic parsing.
```

user-search

Search for users/groups in the user directory that match the specified search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Name of the user/group	string
Kind of object	`User` / `Group`
DN of the user/group	string

user-show

Show the desktops available for the user.

Parseable Output in the case of a user: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string

Desktop ID	integer
Kind of Assignment	`User` / `Token <token>` / `Group <group_name>` / `Custom Group <group_name>`

Parseable Output in the case of a group: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

user-desktops

Show the desktops assigned to the user.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

group-list

Lists all custom groups.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Custom Group Name	string

group-show

Show the pools assigned to the custom group.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string

token-search

Search for tokens that match the search criteria.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Token	string
Name of the Associated User	string
DN of the Associated User	string

token-show

Show the desktops available for the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Desktop Name	string
Desktop ID	integer
Kind of Assignment	`User` / `Token` / `Group <group_name>` / `Custom Group <group_name>`

token-desktops

Show the desktops assigned to the token.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	integer
Pool Name	string
Type of Assignment	`flexible` / `personal`
Is Default Desktop	`true` / `false`

pool-list

List all pools.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Pool Name	string
Type of Desktop Assignment	`Personal` / `Flexible`
Number of Desktops	integer
Desktop Provider Name	string

pool-show

Show detailed information about the pool.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Assignment Status	`Enabled` / `Disabled`
Type of Desktop Assignment	`Personal` / `Flexible`
Desktop Provider Name	string
Cloning Status	`Enabled` / `Disabled`
Template	None / string
Number of Cloning Jobs	integer

Number of Available Desktops	integer
Number of Assigned Desktops	integer
Total Number of Desktops	integer
Guest Pool	`Enabled` / `Disabled`

pool-desktops

List all desktops from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Unknown`
Desktop State	`Available` / `Used` / `Idle` / `Unresponsive` / `Reserved` / etc.
DN of Assigned User	string

pool-templates

List all templates from the pool.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long
Machine State	`Running` / `Powered Off` / `Suspended` / `Aborted` / `Unknown`
Master Revision	string
Cloned Desktops	string

template-revisions

List the revisions of the template.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Revision Name	string
Revision ID	long
Creation Date	timestamp
Is It Master	`yes` / `no`
Cloned Desktops	string

provider-list

List all desktop providers.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Provider Name	string
Provider Type	`Sun VirtualBox` / `VMware vCenter` / `Microsoft Hyper-V` / `Microsoft Remote Desktop`
Total Number of Desktops	integer
Number of Used Desktops	integer
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Storage Usage	`xx% (x.x GB/MB)`

provider-list-hosts

List all hosts for the VirtualBox desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Status	OK / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
CPU Usage	`xx% (x.x GHz/MHz)`
Memory Usage	`xx% (x.x GB/MB)`
Number of Desktops	integer

provider-list-storage

List all storage servers for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Status	OK / `Unresponsive` / etc.
Enabled	`Enabled` / `Disabled`
ZFS Pool	string
Capacity	`xxx.x GB`
Usage	`xx.x GB`
Number of Desktops	integer

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Storage ID	string

ZFS Pool	string
Capacity	`xxx.x GB`
Usage	`xx.x GB`
Number of Desktops	integer

provider-list-templates

List the templates for the desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	string
Path	string

provider-list-unmanaged

List the desktops from the virtualization platform that are not managed by any desktop provider.

Parseable Output for VirtualBox and Hyper-V providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Desktop Name	string
Desktop ID	long

Parseable Output for VMware vCenter providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Desktop Name	string
Desktop ID	string

provider-list-networks

List all networks for the desktop provider.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Subnet Label	String
Subnet Address	String
Availability	`All Hosts / Not on: <comma_separated_list_of_hosts>`

job-list

List the existing jobs.

Parseable Output: list of lines with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
ID of the Job	integer
Cancellable	'C' if the job can be cancelled

job-show

Show the job details.

Parseable Output: one line with the following values separated by a colon (':').

Value	Data Format
Job Title	`Cloning Desktop <desktop_name>` / `Recycling Desktop <desktop_name>` / `Starting Desktop <desktop_name>` / `Powering Off Desktop <desktop_name>` / `Shutting Down Desktop <desktop_name>` / `Restarting Desktop <desktop_name>` / `Deleting Pool <pool_name>` / etc.
Target of the Job	string
Status of the Job	`Queued` / `Running` / `Completed` / `Failed` / `Cancelling` / `Cancelled`
Start Time	hh:mm:ss
End Time	hh:mm:ss
Job Details	string
Cancellable	`true` / `false`

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- About the Bundled Sun Ray Kiosk Session
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Sun Ray Access (All Topics)

The following documentation details Sun Ray Software and client access as it pertains to their use with Oracle Virtual Desktop Infrastructure. It is not meant to be an in-depth resource for administration of Sun Ray Software and Sun Ray Thin Clients. For more details on Sun Ray Software and Sun Ray Thin Clients refer to the Sun Ray Software documentation.

About the Bundled Sun Ray Software

Since version 3, Oracle Virtual Desktop Infrastructure has included a common installer for the Oracle VDI Core Software and the Sun Ray Software components which installs and configures a default version of Sun Ray Software for Oracle Virtual Desktop Infrastructure. The common installer is a significant improvement for installation and configuration of a full Oracle Virtual Desktop Infrastructure solution, especially for administrators who are less familiar with Sun Ray Software. Administrators who have a strong Sun Ray Software background may choose to change the defaults of the configuration that is installed for Oracle Virtual Desktop Infrastructure by reviewing the Oracle Virtual Desktop Infrastructure Defaults page and using the included links to access relevant Sun Ray Software information.

The bundled Sun Ray Software is based on Sun Ray Software 5, which includes several features that can also be useful in Oracle Virtual Desktop Infrastructure. For more information about Sun Ray Software 5 features, refer to the following link:

- What's New for Sun Ray Software 5

About the Bundled Sun Ray Kiosk Session

Sun Ray Software is typically used to serve standard UNIX desktop sessions. However, other session types can be easily supported taking advantage of the Sun Ray Kiosk mode. Oracle Virtual Desktop Infrastructure comes with a predefined Kiosk session (called Sun Virtual Desktop Access - VDA) that uses the Sun Ray Windows Connector to establish a remote desktop protocol (RDP) connection to a virtual machine.

A Sun Ray Kiosk session is initiated when a user inserts a smart card into a Sun Ray Thin Client. The new session will first bring up a login dialog asking for user name and password (and optionally a Windows domain). This type of authentication can be disabled if required, refer to the How to Disable Client Authentication page.

Oracle does not require the usage of smart cards. Per default the Kiosk session is enabled for smart card and non-smart card access.

After successful authentication, the system will contact the Oracle VDI Core service to determine the desktops assigned to the logged in user. If multiple desktops are available, the user will get a desktop selection dialog. Once the user has selected a desktop, the Sun Ray Windows Connector will startup and connect to the virtual machine running the desktop. Refer to the How to Access Desktops Using a Sun Ray Client (with a VDI Desktop Selector) page for more information.

Sun Ray Kiosk Session Configuration

The appearance and behavior of the Kiosk session can be configured via a number of session parameters. These parameters can be split up into two groups: Settings specific for the VDA session (affecting the desktop selector dialog), and settings specific for the Sun Ray Windows Connector (also known as uttsc) (affecting the quality of the RDP connection). The general syntax is:

```
<specific settings for desktop selector> -- <uttsc specific settings>
```

Supported VDI Desktop Selector Parameters

Per default the login/desktop selector dialog will take advantage of the Java Runtime Environment bundled with Oracle Virtual Desktop Infrastructure. However, an alternative path can be specified using the "-j" option. We recommend to use Java 6 for the dialog to get better locale support and to take advantage of the latest improvements in the Java Swing area.

Other Kiosk parameters set default values for the input fields or hide/display certain UI elements in the dialog.

```
-n (--no-desktop-selector)    - Disables the desktop selector completely.
-d (--default-domain)         - Allows to preset domain input field.
-l (--list-of-domains)        - Preset the domain selector pulldown, e.g. -l
vdatest.germany,qa.ireland
-t (--timeout)                - Specifies the timeout applied after login (seconds)
-j (--java-home)              - Path to JRE used by the selector dialog.
-a (--allow-username-editing) - Allow users to login with a different user name
(normally the user name
                                field is readonly).
-h (--no-username-field)      - Always hide the user name input field.
-o (--no-domain-field)        - Always hide domain input field.
-w (--show-password-field)    - Always show password field
-r (--screen-resolutions)     - Preset the screen resolution menu (under more options),
e.g. -r 1920x1200,2560x1600
```

Disabling the desktop selector
If you disable the desktop login/selector dialog with the "-n" option, then users have no possibility to enter their password prior to accessing a desktop. Thus if you disable this dialog, you must also disable the client authentication at the same time. Refer to the How to Disable Client Authentication page for more information.

Supported Sun Ray Windows Connector (uttsc) Parameters

See the uttsc man page for a complete listing of the supported parameters. The list below is just an extract of the settings to illustrate the configuration options.

```
-r sound:[low|high|off]    - Disable sound redirection from the server to the client or
change the quality of
                             transmitted sound. The sound quality in terms of bits per
second can be specified.
                             A "low" quality transmits 8khz and a "high" quality does
22.2 khz.  By default, High
                             quality sound is enabled.

-A color depth             - Sets the colour depth for the connection (8, 15, 16  or
24).
                             The  colour  depth  may be limited by the server
configuration in which case
                             the server configuration is honored.

-E window-attribute        - Enable window attributes from the defined set. The
available set of options which
                             can be enabled are:
                                wallpaper,  fullwindowdrag,  menuanimations,   theming,
                                cursorshadow,  cursorsettings.
                             Keeping these attributes disabled improves display
performance  especially over lower
                             bandwidth  networks.  Multiple -E options can be specified
for more than one attribute
                             if required.
```

How to Adapt the Bundled Sun Ray Kiosk Session

Use the instructions provided by the Sun Ray documentation to adapt the default Sun Ray Kiosk settings.
Your entry in the arguments field could look like the following:

```
-d vdatest -j /usr/java6 -- -E wallpaper -E theming
```

For more about the default Sun Ray Kiosk settings, see the Oracle Virtual Desktop Infrastructure Defaults page.

Activating New Settings

The new settings will become active for every newly created Kiosk session. If you want to enforce the settings for existing sessions also, then you can perform a cold Sun Ray services restart. This will terminate all existing sessions and will create new Kiosk sessions as necessary.

Manager Steps

1. Switch to the Servers tab.
2. Select all servers in your Oracle VDI environment.
3. Click on Cold Restart to initiate the Sun Ray services restart.
4. This operation can take up to several minutes.

CLI Steps
Refer to the Sun Ray Documentation for more information.

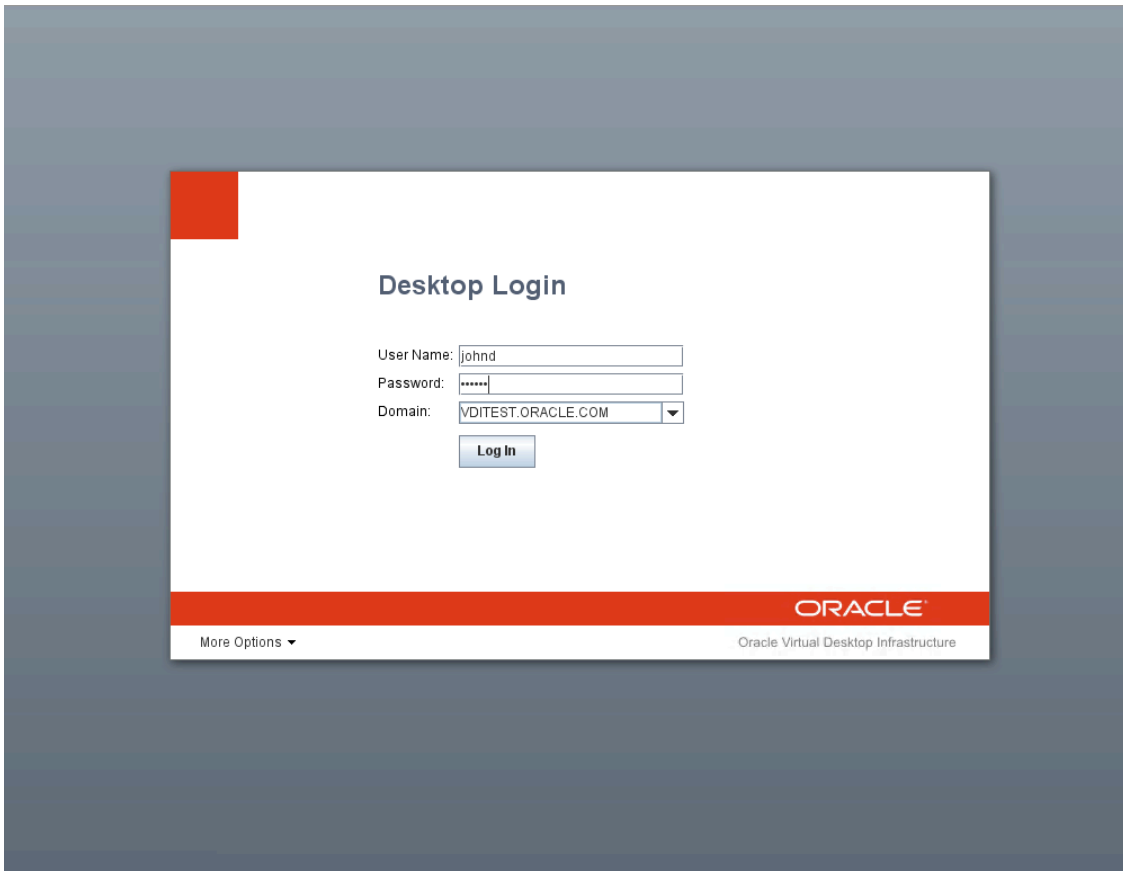
How to Access Desktops Using a Sun Ray Client

The following screenshots illustrate how to access a desktop from an end-user perspective using Sun Ray clients (Thin Clients or Oracle Virtual Desktop Client instances).

With Oracle Virtual Desktop Infrastructure, all users must authenticate themselves before getting access to any desktops. Also new is the possibility to select between multiple desktops. This behavior can be configured using the information on the How to Adapt the Bundled Sun Ray Kiosk Session page.

With an Oracle VDI Desktop Selector

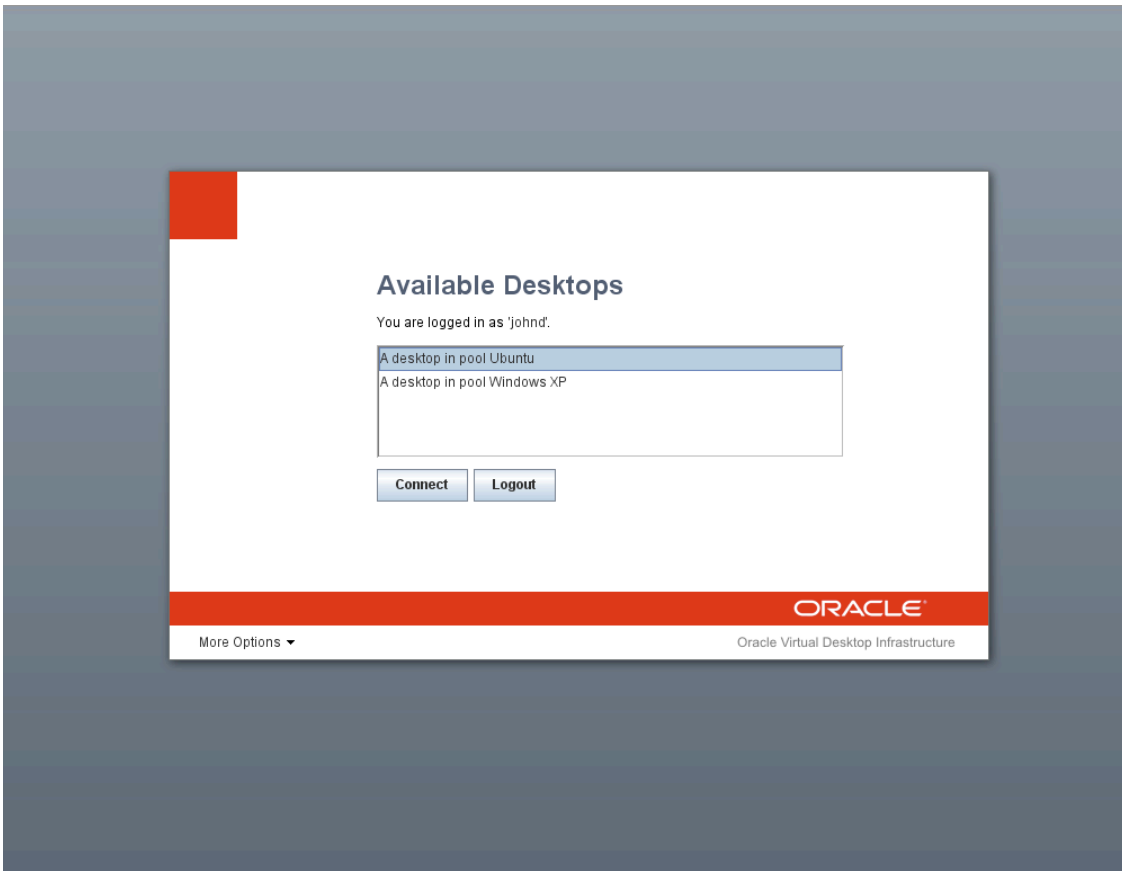
1. Log into Oracle Virtual Desktop Infrastructure.



Insert a smart card (token) that has been assigned to a pool, or a desktop directly (as described before) into a Sun Ray Thin Client that is connected to an Oracle VDI Core host. It should display a login screen, after a short while. You must provide your user name and password (and optionally a Windows domain).

> Oracle Virtual Desktop Infrastructure does not require the usage of smart cards. Per default desktop access is enabled for smart card and non-smart card usage.

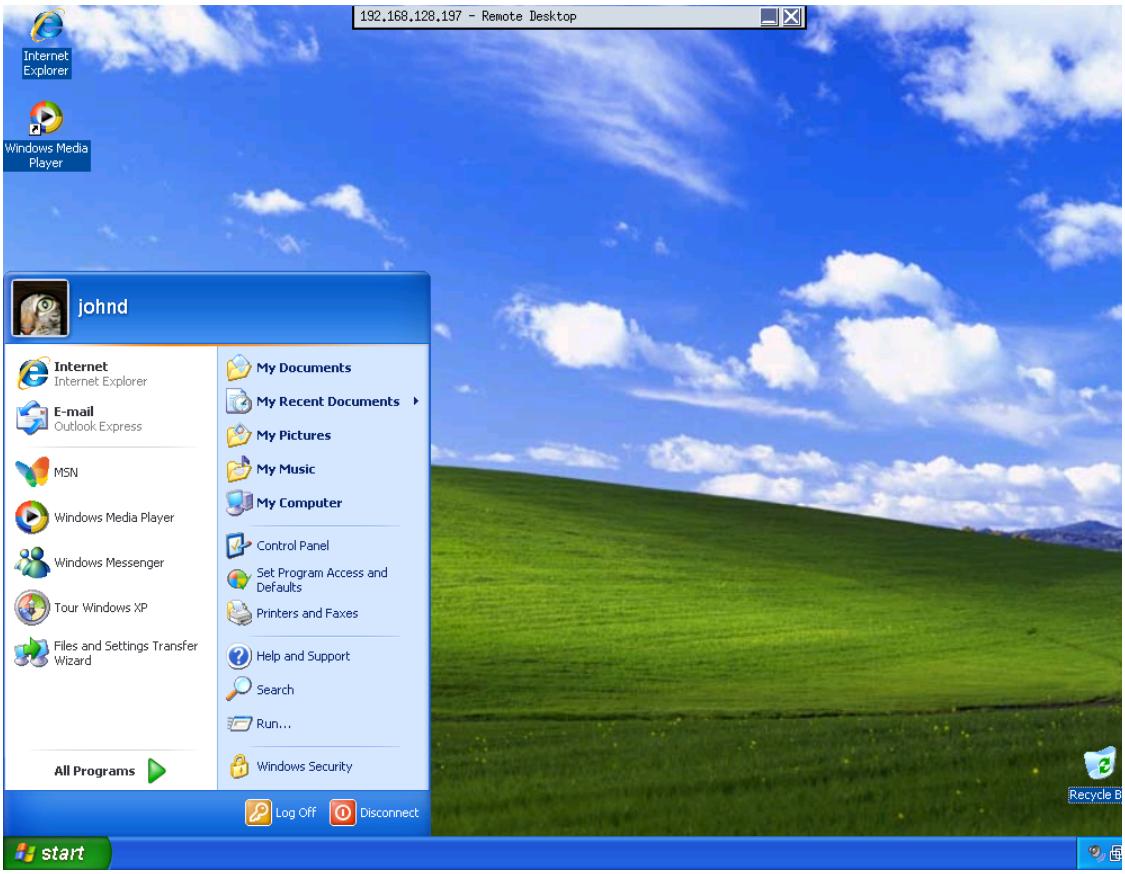
2. Select a desktop or pool.



After successful authentication, the system will determine the desktops (and pools) assigned to you. If multiple desktops are available, you will get a desktop selection dialog. The selection screen will be skipped, if there is only one desktop available to you.

> You will be automatically logged out, if you do not select a desktop within three minutes (the default timeout).

3. Work with the desktop.



Once you have selected a desktop, the Sun Ray Connector for Windows OS will startup and will display your desktop. At any time you can disconnect from your desktop by moving your mouse up to the top of the screen. A remote desktop pulldown menu will appear. Hitting the "X" from the menu will disconnect you from the current desktop session and the desktop selection menu (or the login screen) will appear again.

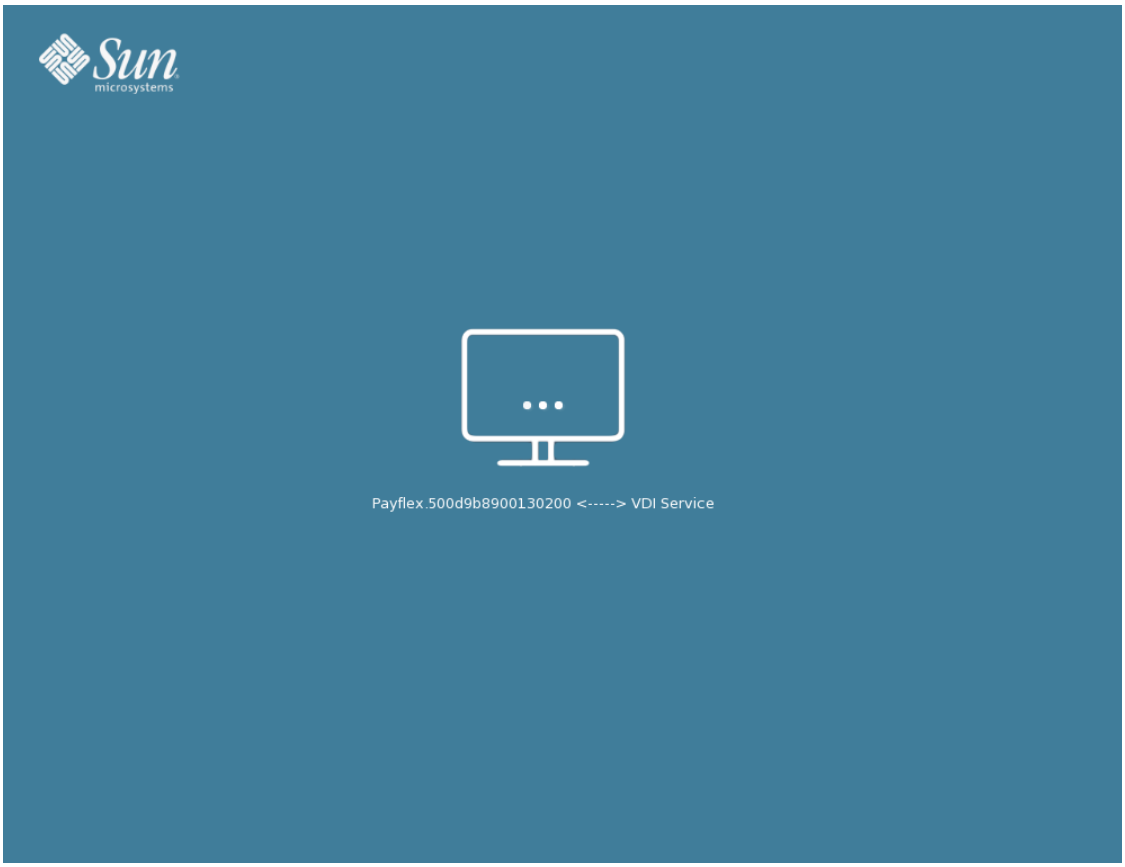
> There is also a Disconnect button available in the Windows start menu, for desktops connected via Windows RDP. Desktops connected through Oracle VM VirtualBox RDP (VRDP) will not offer this button.

Without an Oracle VDI Desktop Selector

The Oracle VDI Desktop Selector dialog can be disabled with the "-n" Kiosk session option. In this setup users are always connected to their default desktop without the need to pass any other Oracle VDI Dialogs.

> If you disable the desktop selector dialog, users do not have the possibility to enter their password prior to accessing a desktop. Thus to make this setup work, you must also disable the Oracle VDI Client Authentication - see Disabling Client Authentication.

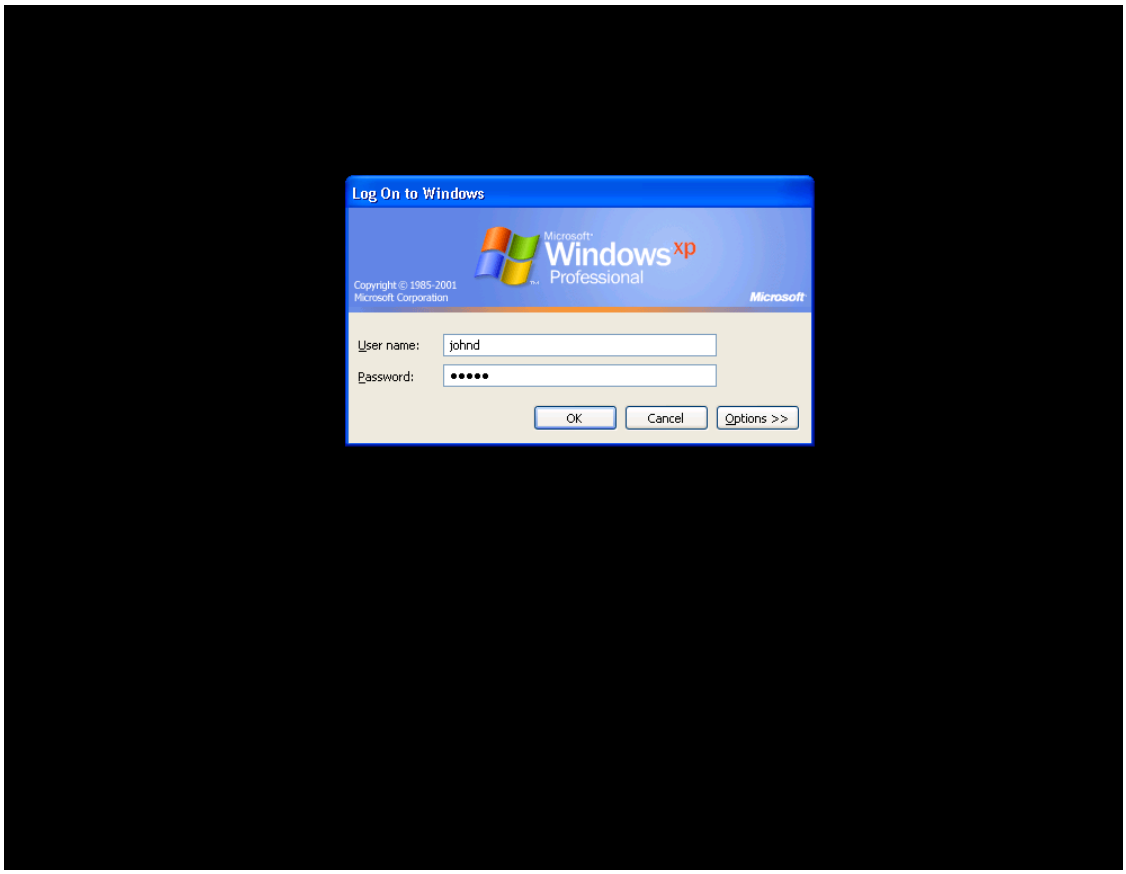
1. Start the desktop.



Insert a smart card (token) that has been assigned to a pool, or a desktop directly (as described before) into a Sun Ray Thin Client that is connected to an Oracle VDI Core host. Oracle Virtual Desktop Infrastructure will determine the assigned default desktop and will start it up if necessary. During that time a wait screen is displayed.

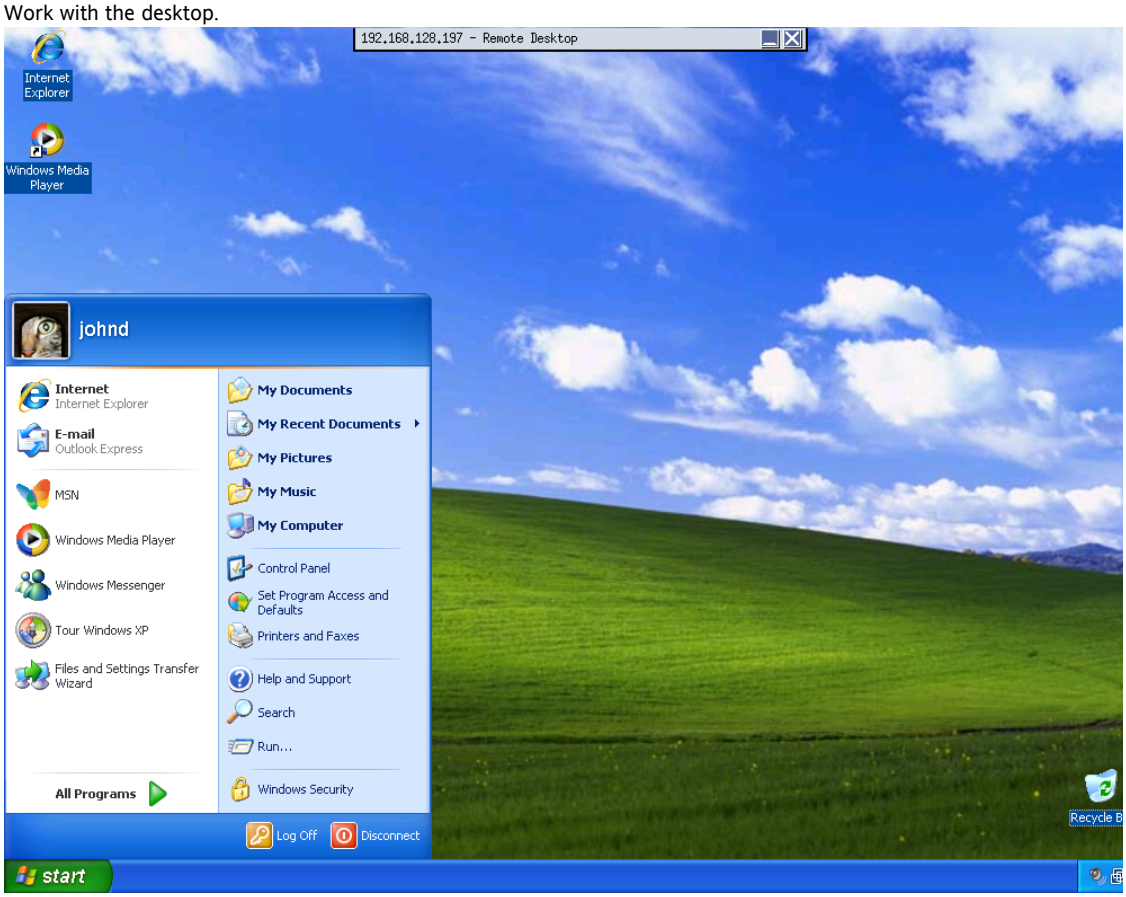
> Oracle Virtual Desktop Infrastructure does not require the usage of smart cards. Per default desktop access is enabled for smart card and non-smart card usage.

2. Log in to the desktop.



It is good practice, if desktops are configured to always present their own login screen before displaying the actual desktop content. This way authentication is still required, but it is now performed on the guest OS level.
In this example you will get the standard Windows login screen. Depending on your guest OS configuration you must enter user name/password (and potentially the Windows domain).

3. Work with the desktop.



Once you have successfully logged in you will get your desktop content displayed. The behavior is the same as for a standard Windows PC.

How to Configure Multi-Monitor

The Multi-Monitor feature introduced in Oracle Virtual Desktop Infrastructure 3.2.2 enables use of more than one monitor connected to a DTU or to a Sun Ray Multihead Group. The desktops may be configured to display one desktop session across multiple monitors, or multiple desktop sessions across multiple monitors.

At a minimum, the feature requires a Sun Ray DTU (like a Sun Ray 2FS or Sun Ray 3 Plus) with two monitors connected and the desktop selector enabled. If more than two screens are required, a Sun Ray Multihead Group can be configured to connect several DTUs.

Multi-Desktop

If more then one desktop is assigned to a user, and more then one monitor is available, then the desktop selector allows to select and connect to multiple desktops.

The desktops will be displayed in the order they are listed. For example, the first desktop will be displayed on the first monitor. To change the order in which the desktops are displayed, the user must return to the desktop selector by logging out or closing the Sun Ray Windows Connector session. The previously displayed desktops will be marked with a monitor icon. When one of the desktops marked with a monitor is selected, arrows will be displayed allowing each desktop to be promoted or demoted in position. When the desktops have been re-ordered, the user may reselect the ones they wish to view and click Connect.

Multi-Monitor

The Multi-Monitor feature relies on the multiple remote monitors feature from Oracle VM VirtualBox, which enables configuration of up to eight monitors per one Oracle VDI desktop session. The Multi-Monitor feature is supported for Windows XP and Windows 7 guests hosted by Oracle VM VirtualBox and using VRDP.

Steps

- In the template:
    1. Reconfigure the display properties to extend the desktop to multiple monitors.
        a. Select Control Panel from the Start menu.
        b. Go to Appearance and Personalization, Personalization, then Display Settings.
        c. Select Identify Monitors and order them accordingly.
- In the Oracle VDI Manager:
    1. Go to the Settings tab for a pool and modify the Monitor Property by configuring the desired number of monitors for the pool.
    2. Trigger the change.
        - For a desktop in the running state - power cycle it (Power Off / Power On).
        - For a desktop in the powered off state - start it up.

If Sysprep will be used as part of cloning, any multi-monitor configuration setup within the template will be removed. For example, if the template is configured to use three displays, after cloning this configuration will be lost and the clone will only contain one enabled display. The end user would then need to re-enable display two and three.
Therefore, for pools using Sysprep, only the Monitor Property should be configured.
FastPrep is not affected by this issue.

Sun Ray Multihead Groups

The Sun Ray 2FS and Sun Ray 3 Plus DTUs support two monitors already. In order to create a large array of monitors, several Sun Rays can be hooked together to form a multihead group. When configuring multihead groups, ensure that XINERAMA is left disabled. For more details on configuring Multihead Groups, refer to the Managing Multihead Configurations (All Topics) page in the Sun Ray documentation set.

A multihead group can be used both to display several desktops or one desktop hosted on Oracle VM VirtualBox with several screens.


ubuntu

Hotdesking and Multi-Monitor Feature

There is a possibility that moving from one DTU to another will leave some open windows on non-existing monitors. In that case, the end user must go to Control Panel, launch the Display Properties application, and modify the number of available monitors. After that, all windows from the invisible monitors will be brought over to the existing monitors. That will allow the user to see all windows again.

How to Access the Sun Ray Administration GUI

The Sun Ray Administration GUI is configured and accessible on each Oracle VDI host. This allows easy modification of Sun Ray configuration settings such as Kiosk session parameters (see following section).

Steps

1. Go to `http://<server name>:1660`.
2. You will be re-directed to https and the web browser will ask you to accept the security certificate. After confirmation, you should get the login screen.
3. You must login as super user ("root") with corresponding password.

> Oracle VDI does not use the default "admin" user account that is normally configured as part of the Sun Ray Software installation.

How to Change User Password

The desktop login/selector dialog allows end-users working from Sun Ray thin clients (DTUs) to update their password in the user directory.

Password Change is not offered when Client Authentication is disabled.

Supported User Directories

Oracle VDI supports password change on the following directory servers:

- Active Directory (from Windows Server 2003 and 2008)
- Sun Directory Server

The authentication type selected to integrate the user directory with Oracle VDI affects the password change functionality:

- Kerberos authentication and Public Key authentication allow end-users to change their password before it has expired as well as after expiration.
- LDAP Anonymous Authentication, LDAP Simple Authentication and LDAP Secure Authentication allow end-users to change their password before it has expired only. If the user password expires in such a configuration, the end-user will be required to update her password using a customer-provided process external to Oracle VDI.

A default restriction in Active Directory prevents password update from an LDAP Simple Authentication.

The user password has already expired

If integrating with an Active Directory server using Kerberos authentication or Public Key authentication:

1. the end-user enters her login credentials in the login dialog
2. the system detects that the user password has expired and direct the user to the password change dialog where the user is offered to type her old and new passwords (new password needs to be entered twice)
3. after a successful password update, the user is authenticated with the new password and the system will offer the same screen as after a regular successful authentication.

If using an LDAP type of authentication:

1. the end-user enters her login credentials in the login dialog
2. the system detects that the user password has expired and displays an error message to the end-user
3. the end-user must use an alternate customer-provided process to update her password before to be able to log in again.

The user password has not expired yet

This functionality may only be accessed from the desktop selector dialog, which is not displayed to the end-user when only one desktop is applicable to her.

This functionality is offered with all types of authentication for the user directory (provided the directory server supports end-users to change their password):

1. the desktop selector dialog offers a More Options... menu at the bottom which contains a Change Password... entry
2. when clicking on Change Password..., the user gets directed to the password change dialog where she is offered to type her old and new passwords (new password needs to be entered twice)
3. the user may cancel her password change, she then goes back to the desktop selector screen without any change to take place
4. when the user confirms the password change, her password gets updated in the directory server and she then goes back to the desktop selector screen with a confirmation message.

Troubleshooting

The update of the password may fail for the following reasons:

- the end-user does not type the right old password
- the new password does not comply to the password policy from the directory server (not allowed to reuse old password, password complexity not met...)
- if using Active Directory server, the Kerberos configuration does not allow password change. See How to Set Up Kerberos Authentication for help on setting up Kerberos authentication.
- the authentication type does not allow password change. See restrictions described in Supported User Directories

In case of trouble, increase the log level in order to get more information about the error in the `/var/cacao/instances/default/logs/cacao.0` log file.

How to Disable Client Authentication

All users must authenticate themselves before getting access to any desktop. Typically users will be asked for a user name/password combination (and optionally a Windows domain). The VDI service will then contact the user directory for the verification of the provided user credentials. If authentication succeeds the connection to the desired desktop will be established - otherwise it will be denied. The user name/password will also be forwarded to the guest OS running the desktop - this way users get automatically logged into their desktop without the need to potentially pass another login screen.

> Automatic login will work for Windows RDP only - forwarding of user credentials does not work yet for VRDP and non-Windows OS.

Authentication on the VDI service level can be disabled if desired. However, special care needs then to be taken on the users' desktops setup to not open unwanted security holes. For example, it is good practice, if desktops are configured to always present their own login screen before displaying the actual desktop content. This way authentication is still required, but it is now performed on the guest OS level only. This setup also allows to take advantage of more advanced authentication techniques that are not supported out of the box by the VDI service.

> For security reasons it is recommended to leave authentication always enabled, unless the simple user name/password authentication does not satisfy your requirements.

Steps

You can use the VDA administration CLI to configure, if authentication should be performed by the VDI service.

To check the currently configured authentication policy:

```
# /opt/SUNWvda/sbin/vda settings-getprops -p clientauthentication
```

To enable authentication (the default):

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientauthentication=Enabled
```

To disable authentication:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientauthentication=Disabled
```

How to Configure RDP Options Per Pool

With Oracle VDI, you can configure the RDP options to be used by Sun Ray sessions when users connect to their desktops.

VDI Manager Steps

1. Sign into the VDI Manager.
    a. Go to http://<server name>:1800 (or http://localhost:1800 if remote administration has been disabled), and use root user credentials. For a multi-host configuration, use one of the VDI Secondary hosts.
    b. You will be re-directed to https and the browser will ask you to accept the security certificate. After confirmation, you should get the login screen.

2. Select the Pools category and select the pool of interest.
    a. In the pool overview, select the Settings tab.
    b. In the Sun Ray section, click the Edit Sun Ray RDP Settings link.
    c. Enable the desired RDP settings and click Save.
    d. Click Back, and select the Use Customized Settings option in the Sun Ray section.
    e. Click Save.

Available RDP Options

Sun Ray Connector for Windows OS (`uttsc`) supports a wide range of options allowing you to configure RDP connections from Sun Ray to your users' desktops.

Oracle VDI enables you to configure a subset of these options on a per pool basis. The following table lists the supported options. For details about how VDI's Sun Ray settings compare to the SRWC `uttsc` settings, refer to the Oracle Virtual Desktop Infrastructure Defaults page.

Name	Description	Default Value
General		
Locale	Use this setting to identify the locale used for users' desktop sessions. Any valid locale identifer may be specified, for example, `en-US` or `de-DE`.	en-US
Keyboard Layout	Use this setting to identify the keyboard type used for users' desktop sessions Valid values for this setting include All Sun and PC USB Keyboards, Sun Type6 Japanese Keyboard, and Sun Korean Keyboard.	All Sun and PC USB Keyboards
Optimized Hotdesking	Use this setting to enable or disable optimized hotdesking behaviour. If enabled, Sun Ray sessions can be hotdesked without restarting `uttsc`.	Disabled
Windows Pulldown Header	Use this setting to enable or disable the Windows pulldown header.	Enabled
RDP Packet Data Compression	Use this setting to enable or disable the compression of RDP packet data.	Enabled
Appearance		
Colour Depth	Use this setting to specify the preferred colour depth for users' desktop sessions. Valid values for this setting are 8, 15, 16, 24 and 32. Note: Colour depth may be limited by configuration of the desktop to which a user connects. In such cases the available colour depths of the desktop will take priority over the colour depth configured for the pool containing the desktop.	32
Theming	Use this setting to enable or disable theming for users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Desktop Background	Use this setting to enable or disable the desktop background for users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Show Window Contents While Dragging	Use this setting to enable or disable the ability to show complete window contents while dragging windows in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled

Transition Effects for Menus	Use this setting to enable or disable visual effects during the use of menus in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Pointer Shadow	Use this setting to enable or disable the use of pointer shadow in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Pointer Scheme	Use this setting to enable or disable the use of pointer schemes in users' desktop sessions. Note: Disabling this setting can improve display performance.	Disabled
Sound	Use this setting to control sound quality in users' desktop sessions. Valid values for this setting are “High” (to enable high quality sound), “Low” (to enable low quality sound) and “Off” (to disable sound).	High
Redirection		
Smart Cards	Use this setting to enable or disable smart card redirection from a DTU to users' desktop sessions.	Disabled
USB	Use this setting to enable or disable USB redirection from a DTU to users' desktop sessions.	Enabled
Serial Devices	Use this setting to identify serial devices which should be redirected to users' desktop sessions. Valid values for this setting are specified using the format <comport>=<device> where <device> identifies the serial device to be redirected and <comport> identifies the port (on the users' desktops) that <device> should be redirected to.	No serial devices are redirected by default.
Paths	Use this setting to identify paths (available on a VDI host) which should be redirected to drives on users' desktop sessions. Valid values for this setting are specified using the format <drive name>=<path> where <path> identifies the path to be redirected and <drive name> identifies the drive (on the users' desktops) that <path> should be redirected to.	No paths are redirected by default.
Printers	Use this setting to identify printer queues which should be redirected to users' desktop sessions. Valid values for this setting are specified using the format <printer>=[<driver>] where <printer> identifies the printer queue to be redirected and <driver> identifies a printer driver to be used for the printer on users' desktop sessions. If <driver> is omitted, a simple PostScript driver is used by default.	No printer queues are redirected by default.

How to Configure Smart Card Removal

You can control what should happen to a user's desktop after a smartcard is removed from a Sun Ray Thin Client. Using the Smart Card Removal Policy, you can indicate that a user's desktop should be shut down, suspended, or recycled when the smart card has been out of a Sun Ray Thin Client for a specific length of time. If the user reinserts a smart card before the specified time has elapsed, the associated action on the desktop will be canceled. The Smart Card Removal Policy is configurable per pool and is available for all Oracle VDI, Microsoft Hyper-V, and VMware vCenter pools. This policy may be configured using the Oracle VDI Manager or CLI.

Recycling is applied only to desktops that have flexible assignments. Choosing the recycle option for your Smart Card Removal Policy will have no effect on personally assigned desktops.

Oracle VDI Manager Steps

1. Sign into the Oracle VDI Manager.

2. Navigate to the pool's Settings tab for the pool to be configured.
    a. In the Sun Ray section, indicate the action you want to be associated with removal of smart cards from thin clients using the Action on Card Removal menu.
        - No Action - Select if you want Oracle Virtual Desktop Infrastructure to ignore smart card removals.
        - Recycle Desktop - Select if you want flexibly assigned desktops to be recycled.
        - Shutdown Desktop - Select if you want desktops to be shut down.
        - Suspend - Select if you want desktops to be suspended.
    b. Specify the number of seconds a smart card must be removed from a thin client before any action should be taken in the Delay Action field.
    c. Click Save.

CLI Steps

1. Open a terminal window and sign in to the server with root credentials.
   For a multi-host configuration, use one of the Oracle VDI Core Secondary hosts.

2. Configure the desktop action associated with smart card removal.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p card-removed=<desktop action> <pool
name>
```

3. Specify the length of time (in seconds) that a smart card must be out of a thin client before the action is performed.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p card-removed-timeout=<time in seconds>
<pool name>
```

- Example – Specify the desktop action that should be performed after a smart card has been out of a thin client for a given amount of time

```
# /opt/SUNWvda/sbin/vda pool-setprops -p
card-removed=suspend,card-removed-timeout=30 MyPool
```

How to Enable Desktop Screen Locking on Sun Ray Clients

This procedure shows you how to configure screen locking for Sun Ray clients in an Oracle VDI environment.

With the hotdesking feature, you must authenticate to access your assigned desktop when you initially insert your smart card. But, once you are logged into your desktop session, you can move to other Sun Ray clients by removing and reinserting your smart card without having to log in again. This is actually one of the strengths of hotdesking.

However, some groups may find this scenario to be a security issue. For example, if you loose your smart card, the smart card could be used by a different person to get access to the your desktop session without the need to enter any password.

Enabling desktop screen locking forces you to provide a password whenever you insert your smart card, even when you are currently logged into your desktop session. The domain field and the user field on the login screen are already provided.

By default, desktop screen locking is disabled.

- To check the current desktop screen locking policy:

```
# /opt/SUNWvda/sbin/vda settings-getprops -p clientscreenlock
```

- To enable desktop screen locking:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientscreenlock=Enabled
```

- To disable desktop screen locking (default):

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientscreenlock=Disabled
```

Windows RDP Versus VirtualBox RDP

Remote desktop protocols (RDPs) are responsible for data transmission to and from the VDI Core. Oracle VDI supports two different types of RDP – Windows RDP (MS-RDP) and VirtualBox RDP (VRDP). If you have rigid requirements for a virtualization platform and guest OSes for your desktop sessions, you might not have an option of which RDP type you use. However, if you are using an Oracle VDI Hypervisor and delivering either Windows XP, Windows Vista, or Windows 7 desktops, you have a choice between using MS-RDP or VRDP. However, VRDP is required for Oracle VM VirtualBox NAT-based networking.

Oracle VM VirtualBox RDP (VRDP)

VRDP is the required RDP type for any guest session hosted by an Oracle VDI Hypervisor and running one of the following OSes: Windows 2000 SP4, Ubuntu 8.10, Ubuntu 9.04, Ubuntu 9.10, Ubuntu 10.04, SUSE Linux Enterprise 11, Oracle Enterprise Linux 5.5. Guest sessions running a Windows XP SP2/3, Windows Vista Enterprise, or Windows 7 OS (and hosted by an Oracle VDI Hypervisor) can be configured to use either VRDP or MS-RDP.

Machine Level Connection - VRDP allows the Oracle VDI Core to connect to the guest session at machine level. This characteristic allows the end-user to watch the machine boot, which to the end user makes the Oracle VDI Desktop Session appear to come up faster since they don't have to wait for the internal RDP server to be up and ready to accept connections.

Windows RDP (MS-RDP)

MS-RDP is the required RDP type for any guest session hosted by a Microsoft Hyper-V or VMware vCenter virtualization platform and running Windows XP SP2/3, Windows Vista Enterprise, or Windows 7 OS. Guest sessions hosted by the Oracle VDI Hypervisor and running a Windows XP SP2/3, Windows Vista Enterprise, or Windows 7 OS can be configured to use either VRDP or MS-RDP.

OS Level Connection - MS-RDP connects at OS level. This characteristic does not allow the end-user to watch the machine boot, so the Oracle VDI Desktop Session may appear to come up slower since they have to wait for the internal RDP server to be up and ready to accept connections.

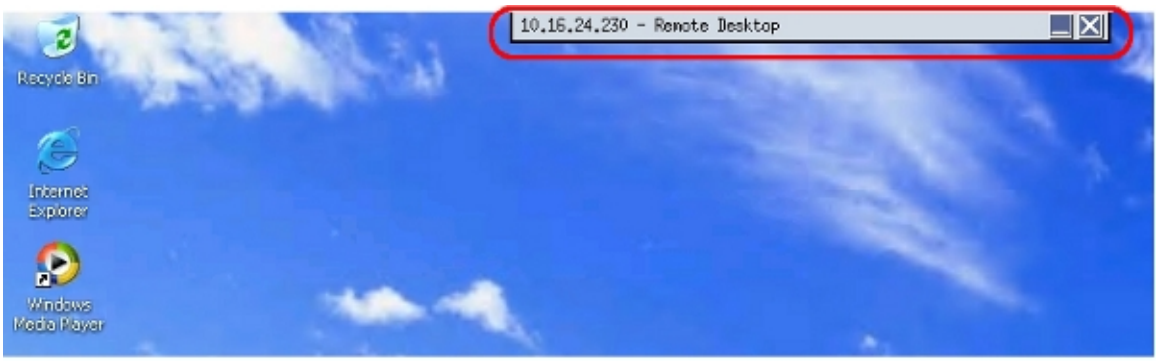
RDP Feature Support

	Win XP	Win Vista	Win 7	Win 2000	Ubuntu 8.10	Ubuntu 9.04	Ubuntu 9
Video Redirection (VRDP)	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ •
Auto-Logon (VRDP and MS-RDP)	✓	✓	✓	✗	✗	✗	✗
Audio Input (MS-RDP)	✓ • Sun Ray Client	✗	✗	✗	✗	✗	✗
USB Redirection (VRDP and MS-RDP)	✓ • VRDP or MS-RDP • Sun Ray Client	✓ • VRDP • Sun Ray Client	✓ • VRDP • Sun Ray Client	✓ • VRDP • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ •

Multimedia Enhancements (VC-1, h.264, Flash) (MS-RDP)	 • Sun Ray Client • Internet Explorer Browser						

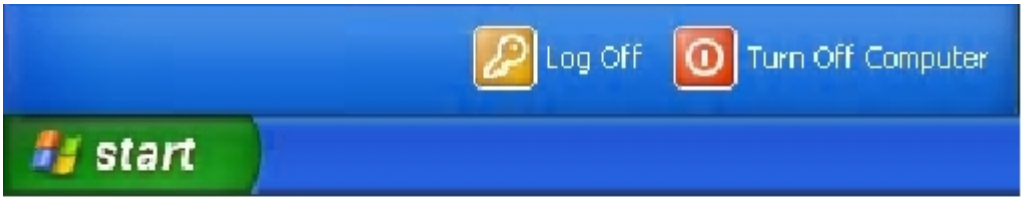
Logging Out of a Desktop Session

Logging out of a desktop that connects with either VRDP or MS-RDP is the same if the end-user clicks the X on the Sun Ray Windows Connector (SRWC) toolbar at the top of the screen. The toolbar is hidden until it is scrolled over.

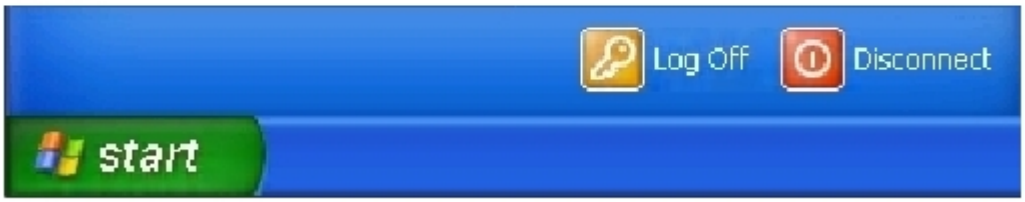


If the end-user uses the Windows Start menu to log out of their desktop, this will also produce a similar result as the X on the SRWC toolbar in a VRDP or a MS-RDP desktop.

If the end-user uses the Windows Start menu to shut down their desktop (red button), their experience will be much different in VRDP than in MS-RDP. Since VRDP connects on machine level, the red button in the Start menu literally shuts down the Windows machine just like a real computer. If the user shuts down their machine this way, the next time they log in, the machine will go through the full boot sequence (screencast above). MS-RDP connects at an OS level, so when the end-user clicks the red button in the Start menu (called "Disconnect"), they effectively log out of their OS session and Oracle VDI Desktop Sessions, but do not shut down the machine. The next time they log in, the desktop will appear to come up very fast.



Start Menu in VRDP



Start Menu in MS-RDP

Therefore, if login performance is a priority on a VRDP desktop, end-users should log out with either the yellow button in the Start menu or with X in the SRWC toolbar.

Oracle Virtual Desktop Infrastructure Defaults

The design of the Oracle VDI Core aims to simplify the management of multiple (typically independent) software components. You should be able to set up a functional and customized Oracle Virtual Desktop Infrastructure setup within the configuration options and with the documentation provided. But, there may also be times when you want to know the Oracle Virtual Desktop Infrastructure defaults on the bundled software. The information on this page is intended to be used as a reference.

Sun Ray Windows Connector (SRWC) 2.2

Oracle VDI Core Configuration

Command	Details	Main Page
`/opt/SUNWuttsc/sbin/uttscadm -c`	Enables SRWC if the Kiosk and LAN settings succeed.	About Oracle VDI Core Configuration

Sun Ray RDP Settings (uttsc)

VDI Name	uttsc option equivalent	Main Page
Locale	-l <locale>	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Keyboard Layout	-k <keyboard>	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Optimized Hotdesking	-O	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Windows Pulldown Header	-b	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
RDP Packet Data Compression	-z	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Color Depth	-A <color depth>	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Theming	-E theming	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Desktop Background	-E wallpaper	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Show Window Contents While Dragging	-E fullwindowdrag	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Transition Effects for Menus	-E menuanimations	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Pointer Shadow	-E cursorshadow	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Pointer Scheme	-E cursorsettings	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Sound	-r sound	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Smart Cards	-r scard:on	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
USB	-r usb:on	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)

Serial Devices	-r comport:	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Paths	-r disk:	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)
Printers	-r printer:	How to Configure RDP Options Per Pool Solaris Sun Ray User Commands - man(1)

Sun Ray Server Software (SRSS) 4.2

Oracle VDI Core Configuration

Command	Details	Main Page
`/opt/SUNWut/sbin/utconfig`	Configures basic SRSS settings: * Administrator password * Server for a FOG * FOG's signature	About Oracle VDI Core Configuration
`/opt/SUNWut/lib/support_lib/srwa_config update`	Configures SRSS Web Administration: * Tomcat's home directory * http ports (1660, 1661) * Webservice's user name(utwww) * Remote access (enabled)	About Oracle VDI Core Configuration
`/opt/SUNWkio/bin/kioskuseradm create -l utku -g utkiosk -i auto -u -c`	Configures Kiosk user accounts	About Oracle VDI Core Configuration
`/opt/SUNWut/lib/utrcmd -n /opt/SUNWut/sbin/utreplica -p -a /opt/SUNWut/sbin/utreplica -s`	Replicates from Primary to Secondary hosts	About Oracle VDI Core Configuration
`/opt/SUNWut/sbin/utadm -L on`	Enables LAN access	About Oracle VDI Core Configuration

`/opt/SUNWut/sbin/utadminuser -a root /opt/SUNWut/sbin/utadminuser -d admin`
Additionally, the following line is commented out in the file `/etc/pam.conf` :
`utadmingui auth sufficient /opt/SUNWut/lib/pam_sunray_admingui.so.1`
	Allows root user access	About Oracle VDI Core Configuration

`/opt/SUNWut/sbin/utkiosk -i session -f`	Sets Kiosk Session value to vda	About Oracle VDI Core Configuration

`/opt/SUNWut/sbin/utpolicy -a -g -z both -k both -m`	Sets Kiosk Policy for both card users and non-card users	About Oracle VDI Core Configuration

Oracle VDI Core

Oracle VDI Core Configuration

Command	Details	Main Page
`svc://application/rdpbroker`	Creates RDP Broker SMF service	About Oracle VDI Core Configuration
	Configures VDA webservice: * Ports are configured (1800 / 1801) * `webuser` is set to `noaccess` * Remote access is enabled	About Oracle VDI Core Configuration
`cacaoadm stop -f`	Stops CACAO	About Oracle VDI Core Configuration
`cacaoadm set-param java-flags=-Xms4M -Xmx256M -Dcom.sun.management.jmxremote -Dfile.encoding=utf-8`	Sets java and file-encoding flags	About Oracle VDI Core Configuration
`cacaoadm start`	Starts CACAO	About Oracle VDI Core Configuration
`cacaoadm enable -i default`	Sets CACAO to start at boot	About Oracle VDI Core Configuration

System Preparation

Command	Details	Main Page
`sysprep.exe -mini -reseal -activated -quiet`	On Windows XP virtual machines	How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)
`sysprep.exe -generalize -oobe -shutdown -quiet`	On Windows Vista and Windows 7 virtual machines	How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)

Contents

- How to Set Up SGD Software and Access a Desktop
- About the Bundled RDP Broker
- Windows RDP Versus VirtualBox RDP
- How to Disable Client Authentication

Secure Web Access (SGD) (All Topics)

How to Set Up SGD Software and Access a Desktop

Oracle Desktop Infrastructure supports secure web access through Oracle Secure Global Desktop. For the most up-to-date information about version support, refer to the Oracle Virtual Desktop Infrastructure 3.2.2 Release Notes.

As of Release 4.6, Oracle Secure Global Desktop includes a VDI Broker as part of the Dynamic Launch feature. To make use of the VDI Broker, Oracle Secure Global Desktop and the Oracle VDI Core must be installed on the same host.

The steps below are a summarized version of the instructions in the SGD documentation. For the most detailed and up-to-date information, refer to Integrating SGD with Oracle VDI

Steps

1. Install Oracle Secure Global Desktop.
   For detailed instructions, refer to the Oracle Secure Global Desktop 4.6 Collection.

   The mechanism for accessing desktops via Oracle Secure Global Desktop has changed since previous versions. The My Desktop Application Object and corresponding expect script are no longer required for Oracle Virtual Desktop Infrastructure.

2. Create a Windows Application Object.
   You need to create a Windows Application Object to offer users an easy way to access the desktops managed by Oracle Virtual Desktop Infrastructure. This can be done using the Tarantella CLI or using the SGD administration console.
   For example, to create a full screen kiosk Windows application using the SGD command line enter the following command.

   ```
   # /opt/tarantella/bin/tarantella object new_windowsapp --name
   ".../_ens/o=applications/cn=Oracle VDI Desktop" \
   --width 1200 --height 1000 --maxinstances 1 --login windows.exp --displayusing
   kiosk --maximize true
   ```

3. Create a Dynamic Application Server for the VDI Broker.
   For information about dynamic application servers and the VDI broker, refer to the Dynamic Application Servers section of the SGD documentation.
   a. In the Administration Console, go to the Application Servers tab.
   b. Create a dynamic application server object for the VDI broker.
      i. Select an object in the organizational hierarchy.
      ii. In the content area, click New.
      The Create a New Object window is displayed.
      iii. In the Name field, type the name of the dynamic application server.
      For example, 'VDI Broker'.

iv. Ensure the Dynamic Application Server option is selected, and click Create.

c. Configure the dynamic application server object.

i. Click the View New Object link.
The General tab for the dynamic application server object is displayed.

ii. In the Virtual Server Broker Class list, select VDI.

iii. In the Virtual Server Broker Parameters field, type 'localhost'.
The VDI broker can only be used if SGD and Oracle VDI are installed on the same host.

iv. Click Save.

4. Assign the VDI Dynamic Application Server to the VDI Windows application.
Ensure that only the VDI Dynamic Application server is assigned to the application. Remove any conventional application server assignments.

a. In the Administration Console, go to the Applications tab and select an application object or a group object.
b. Go to the Hosting Application Servers tab.
c. In the Editable Assignments table, click Add.
d. Locate application server or group objects.
e. Select the check box next to the application server or group objects and click Add.

5. Assign the new Application Object to the users that need to access an Oracle VDI Desktop.
By default, all the users are assigned to the Applications group so an easy way to do so is to add the newly created application object to the Applications group.

```
# /opt/tarantella/bin/tarantella object add_member --name
".../_ens/o=applications/cn=Applications" \
--member ".../_ens/o=applications/cn=Oracle VDI Desktop"
```

Creating the Application Object and adding the object to the Applications group can also be done via the SGD Administration Console. Refer to the Oracle Secure Global Desktop 4.6 Collection for more details on adding Application Objects to SGD.

6. Access a desktop.

a. Log into the SGD webtop.
Use the URL `http://<ssgd_server>/)` as the user who has been assigned the pool/desktop. The Windows Application Object that you've previously created should appear in the list of applications on the left-hand side.

b. Click the Application Object.
You should be asked for user credentials. Then a Windows session for the user will appear on the assigned desktop.

If it is not possible to install SGD and the Oracle VDI Core on the same host, the SGD VDI Broker will not work. In that case, configure SGD using the procedure below.
Windows Application Object Method

Steps

1. Install Oracle Secure Global Desktop.
For detailed instructions, refer to the Oracle Secure Global Desktop 4.6 Collection.

The mechanism for accessing desktops via Oracle Secure Global Desktop has changed since previous versions. The 'My Desktop' Application Object and corresponding expect script are no longer required for Oracle Virtual Desktop Infrastructure.

2. Create a Windows Application Object.
   You need to create a Windows application object to offer users an easy way to access the desktops managed by Oracle Virtual Desktop Infrastructure. This can be done using the tarantella CLI or using the SGD Administration console.
   For example, to create a full screen kiosk Windows application using the SGD command line enter the following command:# /opt/tarantella/bin/tarantella object new_windowsapp --name ".../_ens/o=applications/cn=Oracle VDI Desktop" \
   --width 1200 --height 1000 --maxinstances 1 --login windows.exp --displayusing kiosk --maximize true
3. Configure an application server for the new Application Object.
   If the SGD server and the Oracle VDI Core server are the same machine, no further commands are necessary. An application object will use the SGD server as the application host by default if an explicit application host isn't specified.
   a. However, if you need to create a host object, use the following command.

      ```
      /opt/tarantella/bin/tarantella object new_host --name
      ".../_ens/o=appservers/cn=hostname" --address
      "hostname.domain.com"
      ```

      For more information, refer to the Appendix of the Oracle Secure Global Desktop 4.6 Administration Guide.

   b. To assign the host object to an application object.

      ```
      /opt/tarantella/bin/tarantella object add_host --name
      ".../_ens/o=applications/cn=Oracle VDI Desktop" --host
      ".../_ens/o=appservers/cn=hostname"
      ```

      For more information, refer to the Appendix of the Oracle Secure Global Desktop 4.6 Administration Guide.

4. Assign the new Application Object to the users that need to access an Oracle VDI Desktop.
   By default, all the users are assigned to the Applications group so an easy way to do so is to add the newly created application object to the Applications group.

   ```
   # /opt/tarantella/bin/tarantella object add_member --name
   ".../_ens/o=applications/cn=Applications" \
   --member ".../_ens/o=applications/cn=Oracle VDI Desktop"
   ```

   Creating the Application Object and adding the object to the Applications group can also be done via the SGD Administration Console. Refer to the Oracle Secure Global Desktop 4.6 Collection for more details on adding Application Objects to SGD.

5. Access a desktop.
   a. Log into the SGD webtop.
      Use the URL `http://<ssgd_server>/`) as the user who has been assigned the pool/desktop. The Windows Application Object that you've previously created should appear in the list of applications on the left-hand side.
   b. Click the Application Object.
      You should be asked for user credentials. Then a Windows session for the user will appear on the assigned desktop.

About the Bundled RDP Broker

Oracle Virtual Desktop Infrastructure includes a built-in RDP broker that enables easy desktop access leveraging the Remote Desktop Protocol (RDP). This way users can take advantage of existing RDP clients (for example, the remote desktop connection in Windows XP) for accessing desktops.

How Does it Work?

1. The RDP client first contacts the Oracle VDI RDP broker (passing over any information like username, password, etc).
2. The RDP broker will then contact the Oracle VDI Core service on behalf of the client and will ask to startup the desired desktop.
3. The Oracle VDI Core service will first verify the username/password combination if client authentication is enabled on the service side (default), see How to Disable Client Authentication.
4. If authentication succeeds, the corresponding desktop will be started up and the Oracle VDI Core service returns the IP and optionally RDP port of the virtual machine (VM) running the desktop.
5. This information is used by the RDP broker to construct an RDP Server Redirection Packet containing either:
    - the VM host/IP address as the server to redirect to (if using Windows RDP, as done for VMware Infrastructure 3)
    - or a routing token containing encoded IP address and RDP port information (if using the VirtualBox RDP, also known as VRDP)
      The latter is necessary, because VRDP does not use the standard Windows RDP port. Thus the RDP broker needs to hand back both the IP and the RDP port information. For details of the routing token encoding, see the "Routing Token Format" section of Session Directory and Load Balancing Using Terminal Server.
6. Finally, this RDP redirection packet is sent back to the RDP client and the client will redirect accordingly.

Examples With Uttsc

To connect to any machine from a pool, run the following.

```
/opt/SUNWuttsc/bin/uttsc -u <username>::pool=<poolname> -d <domain> <IP of broker --
any secondary core server>
```

To connect to a specific desktop, run the following.

```
/opt/SUNWuttsc/bin/uttsc -u <username>::pool=<poolname>,desktop=<desktopId> -d <domain>
<IP of broker -- any secondary core server>
```

Supported RDP Clients

RDP clients that support all the above mentioned mechanism and that have been tested with Oracle Virtual Desktop Infrastructure are:

- the Microsoft terminal services client (also known as remote desktop connection) as included in Windows XP and Windows Vista
- the Sun Ray Connector for Windows OS (also known as uttsc)
- the SGD terminal services client (also known as ttatsc, using the updated version delivered as part of Oracle Virtual Desktop Infrastructure)

Other clients may work, but have not been tested by QA.

Security Considerations

Oracle Virtual Desktop Infrastructure authenticates users each time they sign into their desktop. If you would prefer to disable this feature, refer to the How to Disable Client Authentication page.

Windows RDP Versus VirtualBox RDP

Remote desktop protocols (RDPs) are responsible for data transmission to and from the VDI Core. Oracle VDI supports two different types of RDP – Windows RDP (MS-RDP) and VirtualBox RDP (VRDP). If you have rigid requirements for a virtualization

platform and guest OSes for your desktop sessions, you might not have an option of which RDP type you use. However, if you are using an Oracle VDI Hypervisor and delivering either Windows XP, Windows Vista, or Windows 7 desktops, you have a choice between using MS-RDP or VRDP. However, VRDP is required for Oracle VM VirtualBox NAT-based networking.

Oracle VM VirtualBox RDP (VRDP)

VRDP is the required RDP type for any guest session hosted by an Oracle VDI Hypervisor and running one of the following OSes: Windows 2000 SP4, Ubuntu 8.10, Ubuntu 9.04, Ubuntu 9.10, Ubuntu 10.04, SUSE Linux Enterprise 11, Oracle Enterprise Linux 5.5. Guest sessions running a Windows XP SP2/3, Windows Vista Enterprise, or Windows 7 OS (and hosted by an Oracle VDI Hypervisor) can be configured to use either VRDP or MS-RDP.

Machine Level Connection - VRDP allows the Oracle VDI Core to connect to the guest session at machine level. This characteristic allows the end-user to watch the machine boot, which to the end user makes the Oracle VDI Desktop Session appear to come up faster since they don't have to wait for the internal RDP server to be up and ready to accept connections.

Windows RDP (MS-RDP)

MS-RDP is the required RDP type for any guest session hosted by a Microsoft Hyper-V or VMware vCenter virtualization platform and running Windows XP SP2/3, Windows Vista Enterprise, or Windows 7 OS. Guest sessions hosted by the Oracle VDI Hypervisor and running a Windows XP SP2/3, Windows Vista Enterprise, or Windows 7 OS can be configured to use either VRDP or MS-RDP.

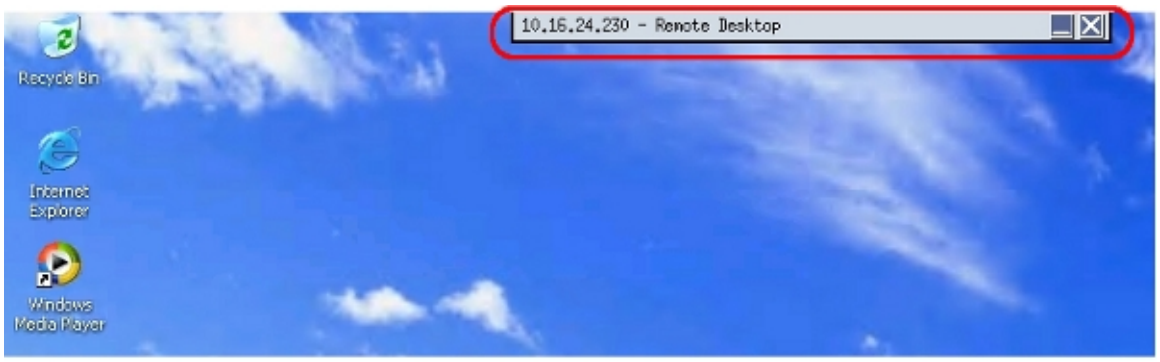
OS Level Connection - MS-RDP connects at OS level. This characteristic does not allow the end-user to watch the machine boot, so the Oracle VDI Desktop Session may appear to come up slower since they have to wait for the internal RDP server to be up and ready to accept connections.

RDP Feature Support

	Win XP	Win Vista	Win 7	Win 2000	Ubuntu 8.10	Ubuntu 9.04	Ubuntu 9
Video Redirection (VRDP)	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ •
Auto-Logon (VRDP and MS-RDP)	✓	✓	✓	✗	✗	✗	✗
Audio Input (MS-RDP)	✓ • Sun Ray Client	✗	✗	✗	✗	✗	✗
USB Redirection (VRDP and MS-RDP)	✓ • VRDP or MS-RDP • Sun Ray Client	✓ • VRDP • Sun Ray Client	✓ • VRDP • Sun Ray Client	✓ • VRDP • Sun Ray Client	✓ • Sun Ray Client	✓ • Sun Ray Client	✓ •
Multimedia Enhancements (VC-1, h.264, Flash) (MS-RDP)	✓ • Sun Ray Client • Internet Explorer Browser	✗	✗	✗	✗	✗	✗

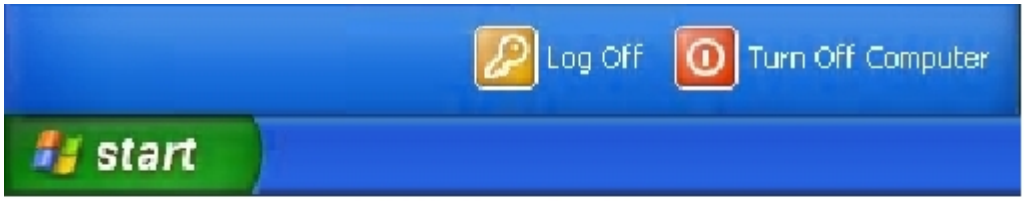
Logging Out of a Desktop Session

Logging out of a desktop that connects with either VRDP or MS-RDP is the same if the end-user clicks the X on the Sun Ray Windows Connector (SRWC) toolbar at the top of the screen. The toolbar is hidden until it is scrolled over.

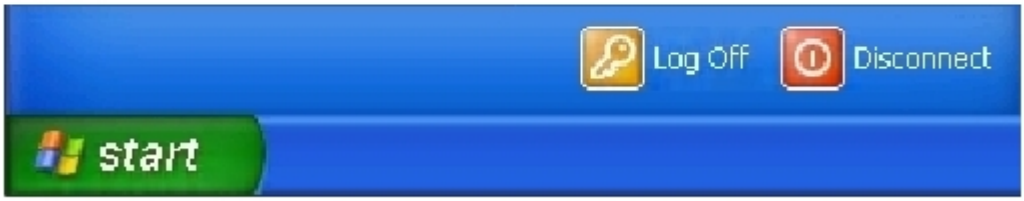


If the end-user uses the Windows Start menu to log out of their desktop, this will also produce a similar result as the X on the SRWC toolbar in a VRDP or a MS-RDP desktop.

If the end-user uses the Windows Start menu to shut down their desktop (red button), their experience will be much different in VRDP than in MS-RDP. Since VRDP connects on machine level, the red button in the Start menu literally shuts down the Windows machine just like a real computer. If the user shuts down their machine this way, the next time they log in, the machine will go through the full boot sequence (screencast above). MS-RDP connects at an OS level, so when the end-user clicks the red button in the Start menu (called "Disconnect"), they effectively log out of their OS session and Oracle VDI Desktop Sessions, but do not shut down the machine. The next time they log in, the desktop will appear to come up very fast.



Start Menu in VRDP



Start Menu in MS-RDP

Therefore, if login performance is a priority on a VRDP desktop, end-users should log out with either the yellow button in the Start menu or with X in the SRWC toolbar.

How to Disable Client Authentication

All users must authenticate themselves before getting access to any desktop. Typically users will be asked for a user name/password combination (and optionally a Windows domain). The VDI service will then contact the user directory for the verification of the provided user credentials. If authentication succeeds the connection to the desired desktop will be established - otherwise it will be denied. The user name/password will also be forwarded to the guest OS running the desktop - this way users get automatically logged into their desktop without the need to potentially pass another login screen.

> Automatic login will work for Windows RDP only - forwarding of user credentials does not work yet for VRDP and non-Windows OS.

Authentication on the VDI service level can be disabled if desired. However, special care needs then to be taken on the users' desktops setup to not open unwanted security holes. For example, it is good practice, if desktops are configured to always present their own login screen before displaying the actual desktop content. This way authentication is still required, but it is now performed on the guest OS level only. This setup also allows to take advantage of more advanced authentication techniques that are not supported out of the box by the VDI service.

For security reasons it is recommended to leave authentication always enabled, unless the simple user name/password authentication does not satisfy your requirements.

Steps

You can use the VDA administration CLI to configure, if authentication should be performed by the VDI service.

To check the currently configured authentication policy:

```
# /opt/SUNWvda/sbin/vda settings-getprops -p clientauthentication
```

To enable authentication (the default):

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientauthentication=Enabled
```

To disable authentication:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientauthentication=Disabled
```

Contents

- How to Access Desktops with Microsoft RDC
- About the Bundled RDP Broker
- How to Disable Client Authentication

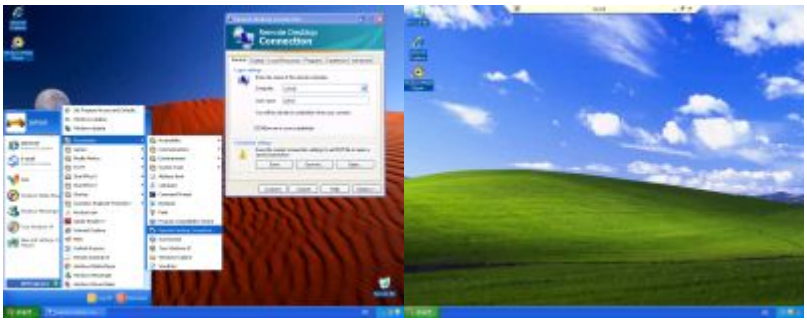
Remote Desktop Client Access (RDC) (All Topics)

How to Access Desktops with Microsoft RDC

Oracle Virtual Desktop Infrastructure includes a built-in RDP broker that allows easy desktop access leveraging the Remote Desktop Protocol (RDP). This way users can take advantage of existing Windows PCs for accessing desktops. There is typically no need to install any additional software on your PC. Both Windows XP and Windows Vista provide out of the box the necessary functionality. The following screenshots illustrate how to access a desktop from an end-user perspective using Windows XP.

Steps

1. Open a remote desktop connection.
    a. Click on Start, All Programs, Accessories, Remote Desktop Connection.
    b. In the dialog, specify as Computer the name, or IP address of the host running the Oracle VDI Core.
    c. Specify the user name, and optionally Windows domain. Click Connect.
    d. A popup dialog will come up asking for the user password. Enter the password and click OK.
    e. After a while, the desktop should be displayed, and be ready to use.



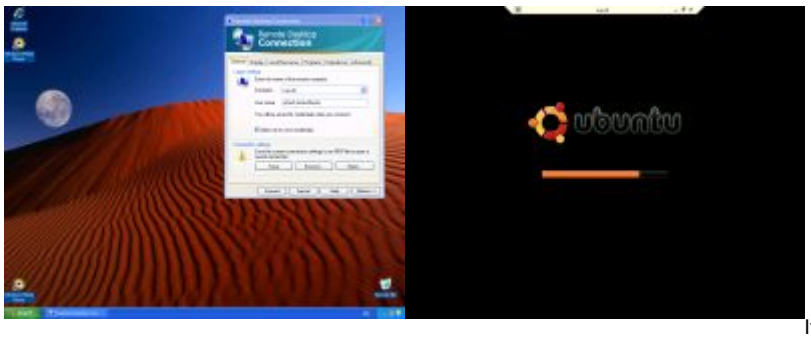
The remote desktop connection on your computer might be configured for performance optimization. Thus certain elements like desktop background, theming, menu and window animations might not be displayed in your setup. You can easily adapt these settings (see Experience tab of the remote desktop connection) to meet your personal requirements.

2. Access a specific desktop or pool.
   If multiple desktops are assigned to a user, then the Oracle VDI Core will connect to the default desktop (which can be defined using the Oracle VDI Manager).
   Alternatively, it is possible to specify the desired desktop or pool when opening the remote desktop connection. Just enter the user name, followed by the pool name, and the optional desktop ID using the following syntax:

   ```
   <username>::pool=<poolname>[,desktop=<desktopId>]
   ```

   It is usually sufficient to just specify the pool name. However, if you have multiple desktops assigned from the same pool, you must specify both the pool name and the desktop ID.

   Desktop identifiers can be listed via the Oracle VDI CLI executing /opt/SUNWvda/sbin/vda user-desktops <username>



   If you frequently switch between various desktops, then it is convenient to store the remote desktop connection settings for each desktop in an RDP file (see Connection Settings, Save As). You can then create shortcuts to these files allowing you to initiate a connection via a simple mouse double-click.

About the Bundled RDP Broker

Oracle Virtual Desktop Infrastructure includes a built-in RDP broker that enables easy desktop access leveraging the Remote Desktop Protocol (RDP). This way users can take advantage of existing RDP clients (for example, the remote desktop connection in Windows XP) for accessing desktops.

How Does it Work?

1. The RDP client first contacts the Oracle VDI RDP broker (passing over any information like username, password, etc).
2. The RDP broker will then contact the Oracle VDI Core service on behalf of the client and will ask to startup the desired desktop.
3. The Oracle VDI Core service will first verify the username/password combination if client authentication is enabled on the service side (default), see How to Disable Client Authentication.
4. If authentication succeeds, the corresponding desktop will be started up and the Oracle VDI Core service returns the IP and optionally RDP port of the virtual machine (VM) running the desktop.
5. This information is used by the RDP broker to construct an RDP Server Redirection Packet containing either:
   - the VM host/IP address as the server to redirect to (if using Windows RDP, as done for VMware Infrastructure 3)
   - or a routing token containing encoded IP address and RDP port information (if using the VirtualBox RDP, also known as VRDP)
     The latter is necessary, because VRDP does not use the standard Windows RDP port. Thus the RDP broker needs to hand back both the IP and the RDP port information. For details of the routing token encoding, see the "Routing Token Format" section of Session Directory and Load Balancing Using Terminal Server.
6. Finally, this RDP redirection packet is sent back to the RDP client and the client will redirect accordingly.

Examples With Uttsc

To connect to any machine from a pool, run the following.

```
/opt/SUNWuttsc/bin/uttsc -u <username>::pool=<poolname> -d <domain> <IP of broker --
any secondary core server>
```

To connect to a specific desktop, run the following.

```
/opt/SUNWuttsc/bin/uttsc -u <username>::pool=<poolname>,desktop=<desktopId> -d <domain>
<IP of broker -- any secondary core server>
```

Supported RDP Clients

RDP clients that support all the above mentioned mechanism and that have been tested with Oracle Virtual Desktop Infrastructure are:

- the Microsoft terminal services client (also known as remote desktop connection) as included in Windows XP and Windows Vista
- the Sun Ray Connector for Windows OS (also known as uttsc)
- the SGD terminal services client (also known as ttatsc, using the updated version delivered as part of Oracle Virtual Desktop Infrastructure)

Other clients may work, but have not been tested by QA.

Security Considerations

Oracle Virtual Desktop Infrastructure authenticates users each time they sign into their desktop. If you would prefer to disable this feature, refer to the How to Disable Client Authentication page.

The page Microsoft RDP Versus VirtualBox RDP does not exist.

How to Disable Client Authentication

All users must authenticate themselves before getting access to any desktop. Typically users will be asked for a user name/password combination (and optionally a Windows domain). The VDI service will then contact the user directory for the verification of the provided user credentials. If authentication succeeds the connection to the desired desktop will be established - otherwise it will be denied. The user name/password will also be forwarded to the guest OS running the desktop - this way users get automatically logged into their desktop without the need to potentially pass another login screen.

Automatic login will work for Windows RDP only - forwarding of user credentials does not work yet for VRDP and non-Windows OS.

Authentication on the VDI service level can be disabled if desired. However, special care needs then to be taken on the users' desktops setup to not open unwanted security holes. For example, it is good practice, if desktops are configured to always present their own login screen before displaying the actual desktop content. This way authentication is still required, but it is now performed on the guest OS level only. This setup also allows to take advantage of more advanced authentication techniques that are not supported out of the box by the VDI service.

For security reasons it is recommended to leave authentication always enabled, unless the simple user name/password authentication does not satisfy your requirements.

Steps

You can use the VDA administration CLI to configure, if authentication should be performed by the VDI service.

To check the currently configured authentication policy:

```
# /opt/SUNWvda/sbin/vda settings-getprops -p clientauthentication
```

To enable authentication (the default):

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientauthentication=Enabled
```

To disable authentication:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p clientauthentication=Disabled
```