

Oracle® Virtual Desktop Infrastructure

Administrator's Guide for Release 3.3



E24173-03
July 2012

Oracle® Virtual Desktop Infrastructure: Administrator's Guide for Release 3.3

Copyright © 2008, 2012, Oracle and/or its affiliates. All rights reserved.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

Oracle Virtual Desktop Client software is an included component of Oracle's Sun Ray Software and Oracle Virtual Desktop Infrastructure software products that must be separately downloaded from Oracle Software Delivery Cloud (<https://edelivery.oracle.com>). Use of Oracle Virtual Desktop Client is subject to the Oracle software license agreement provided with and/or applying to Sun Ray Software and Oracle Virtual Desktop Infrastructure.

Table of Contents

Preface	xi
1. Release Notes	1
1.1. New Features in Oracle VDI Release 3.3	1
1.2. VDA Subcommands, Arguments, and Properties Deprecated in Oracle VDI Release 3.3	3
1.2.1. Password Properties	3
1.2.2. Pool Settings	3
1.2.3. User Directory Settings	4
1.2.4. Remote Access Subcommands	6
1.2.5. Forced Deletion of a User Directory	6
1.3. About the Oracle VDI Package Software	6
1.3.1. Oracle VDI Requirements and Platform Support	7
1.3.2. Additional Supporting Software	7
1.4. Known Issues	8
1.4.1. Templates Cannot be Imported for Hyper-V Desktop Providers on Oracle Linux Platforms (Bug ID 12307034)	8
1.4.2. On Oracle Linux Platforms the GDM Greeter is Visible Until the Kiosk Session is Initialized (Bug ID 12577080)	8
2. System Overview of Oracle Virtual Desktop Infrastructure	11
2.1. Introduction to Oracle Virtual Desktop Infrastructure	11
2.1.1. About Virtualization	12
2.1.2. About Storage	13
2.1.3. About Management	14
2.1.4. About Desktop Access	16
3. Installing Oracle VDI and Configuring Oracle VDI Centers	19
3.1. About Oracle VDI Centers and Hosts	19
3.1.1. Single Oracle VDI Host Configuration	20
3.1.2. High Availability Configuration Using Embedded MySQL Server	20
3.1.3. High Availability Configuration Using Remote MySQL Database	21
3.2. Oracle VDI System Requirements	21
3.2.1. Oracle VDI Hardware Requirements	21
3.2.2. Supported Installation Platforms for Oracle VDI	22
3.2.3. Required Packages for Oracle VDI on Linux Platforms	22
3.2.4. Required Packages for Oracle VDI on Solaris Platforms	23
3.2.5. Required packages for Sun Ray Software	23
3.2.6. Time Synchronization	23
3.3. Preparing to Use a Remote MySQL Database	23
3.4. Oracle VDI Centers in Virtualized Environments	24
3.5. How to Install Oracle VDI	24
3.6. How to Configure Oracle VDI on a Primary Host	25
3.7. How to Configure Oracle VDI on a Secondary Host	26
3.8. Updating Oracle VDI to Release 3.3	28
3.8.1. How to Update an Oracle VDI Center (Single Host)	29
3.8.2. How to Update an Oracle VDI Center (High Availability With Bundled MySQL Cluster)	30
3.8.3. How to Update an Oracle VDI Center (High Availability With Remote MySQL Database)	33
3.9. How to Reconfigure Oracle VDI on a Host	36
3.10. Reinstalling Oracle VDI	36
3.11. How to Uninstall Oracle VDI	36
3.12. Firewall Ports and Protocols	37
3.12.1. Firewalls Between Clients and Oracle VDI	37

3.12.2. Firewalls Between Oracle VDI and User Directories	37
3.12.3. Firewalls Between Oracle VDI and Desktop Providers	38
3.12.4. Firewalls Between the Hosts in an Oracle VDI Center	39
4. Configuring Companies and User Directories	41
4.1. About User Directory Integration	41
4.1.1. Active Directory Types	41
4.1.2. LDAP Types	42
4.1.3. User Directory Customization	43
4.2. Supported User Directories	43
4.3. About Companies	44
4.3.1. Changes to Desktop Selector	44
4.3.2. Corporation Setting	44
4.4. How to Create a Company	45
4.5. How to Set Up Kerberos Authentication	45
4.5.1. Whitelist and Blacklist Support	48
4.6. How to Set Up Public Key Authentication	48
4.7. How to Set Up Anonymous Authentication	50
4.8. How to Set Up Simple Authentication	50
4.9. How to Set Up Secure Authentication	51
4.10. About Complex Forest Configurations	52
4.11. How to Reconfigure the User Directory Settings	53
4.11.1. Defining the User Directory	53
4.11.2. Changing the Security Level	53
4.11.3. Changing the Credentials	54
4.11.4. Updating the Server SSL Certificates	54
4.11.5. Adding Fallback Hosts	54
4.12. About Global Oracle VDI Centers	54
4.12.1. Oracle VDI Center - Home and Foreign	55
4.12.2. Guest Pools	55
4.12.3. Oracle VDI Login and Desktop Selector Dialog	55
4.13. How to Prepare a User Directory for Global Oracle VDI Centers	56
4.13.1. Oracle VDI Center Data Schema	56
4.14. About LDAP Filters and Attributes	57
4.14.1. Searching for Users and Groups	58
4.14.2. Requesting a Desktop for a User	58
4.14.3. Resolving Group Membership	58
4.14.4. LDAP Cache	59
4.15. Removing a Company	59
5. Configuring Desktop Providers and Virtualization Platforms	61
5.1. Oracle VDI Hypervisor	61
5.1.1. About the Oracle VDI Hypervisor	61
5.1.2. System Requirements for the Oracle VDI Hypervisor	62
5.1.3. Updating the Oracle VDI Hypervisor	64
5.1.4. How to Install the Oracle VDI Hypervisor	64
5.1.5. How to Configure the VRDP Port Range	65
5.2. Microsoft Hyper-V and Remote Desktop Services	66
5.2.1. Microsoft Hyper-V	66
5.2.2. Microsoft Remote Desktop Services	66
5.2.3. Preparing a Windows Server	69
5.3. VMware vCenter	71
5.3.1. System Requirements for VMware vCenter	71
5.3.2. How to Set Up a VMware ESX Server	71
5.3.3. How to Set Up a VMware vCenter Server	71
5.3.4. How to Test the Platform Setup	72

5.4. About Generic Desktop Providers	73
5.5. About Sun Ray Kiosk Session Providers	73
5.6. Storage	74
5.6.1. Supported Storage Server Platforms	74
5.6.2. About Storage Clustering	75
5.6.3. How to Set Up an Oracle Solaris Storage Server	76
5.6.4. How to Set Up a Sun Storage 7000 Unified Storage System	77
5.6.5. How to Replicate and Replace a Sun Unified Storage System	77
5.6.6. How to Replicate and Replace an Oracle Solaris Storage System	78
5.7. Desktop Providers	79
5.7.1. How to Create Desktop Providers	79
6. Preparing Desktops	83
6.1. About Pools	84
6.1.1. How to Create Desktop Pools	84
6.1.2. How to Configure Networks Per Pool	85
6.1.3. How to Configure RDP Options Per Pool	86
6.1.4. How to Enable USB Redirection	89
6.1.5. How to Configure Smart Card Removal	90
6.1.6. How to Configure Kiosk Settings (Sun Ray Kiosk Provider)	91
6.1.7. Choosing Between VRDP and MS-RDP	91
6.2. About Desktops	94
6.2.1. Supported Desktop Operating Systems	95
6.2.2. Available Actions for Desktops	95
6.3. About Templates and Revisions	99
6.3.1. Available Actions for Templates	100
6.3.2. Available Actions for Revisions	102
6.4. About Desktop and Virtual Machine States	103
6.4.1. Virtual Machine States	103
6.4.2. Desktop States	104
6.5. Creating Desktop Images	105
6.5.1. How to Create Virtual Machines (Oracle VDI Hypervisor)	105
6.5.2. How to Create Virtual Machines (VMware vCenter)	107
6.5.3. How to Create Virtual Machines (Microsoft Hyper-V)	109
6.6. Importing Desktops	111
6.6.1. How to Import Desktops (Oracle VDI Hypervisor)	111
6.6.2. How to Import Desktops (VMware vCenter)	112
6.6.3. How to Import Desktops (Microsoft Hyper-V)	113
6.6.4. How to Import Individual Windows PCs	114
6.6.5. About Template Management	115
6.7. Cloning Desktops	116
6.7.1. How to Clone Desktops (Oracle VDI Hypervisor)	116
6.7.2. How to Clone Desktops (VMware vCenter)	117
6.7.3. How to Enable VMware Linked Cloning	118
6.7.4. How to Clone Desktops (Microsoft Hyper-V)	119
6.7.5. About Clone Customization	119
6.7.6. How to Debug Fast Preparation Problems	120
6.7.7. How to Enable Oracle VDI Fast Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)	120
6.7.8. How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)	121
6.7.9. About Personal Hard Drives	124
6.7.10. Clone and Recycle Job Management	124
6.8. Assigning Users to Desktops	125
6.8.1. How to Assign Users to Pools or Desktops	125

6.8.2. How to Create Custom Groups and Custom Group Filters	126
6.8.3. How to Assign Tokens to Users	126
6.8.4. How to Assign Tokens to Desktops or Pools	127
6.8.5. How to Create Bulks of Tokens	129
6.8.6. How to Search for Desktops	129
7. Accessing Desktops	131
7.1. About Desktop Access Methods	131
7.2. Sun Ray Software	133
7.2.1. About the Oracle VDI Sun Ray Kiosk Session	133
7.2.2. How to Adapt the Bundled Sun Ray Kiosk Session	135
7.2.3. How to Access Desktops Using a Sun Ray Client	136
7.2.4. Multi-Monitor Support	140
7.2.5. How to Access the Sun Ray Administration GUI	144
7.2.6. How to Change User Password	144
7.2.7. How to Disable Client Authentication	146
7.2.8. How to Enable Desktop Screen Locking on Sun Ray Clients	147
7.3. Secure Web Access with Oracle Secure Global Desktop	147
7.3.1. How to Set Up Oracle Secure Global Desktop Using the Oracle Secure Global Desktop VDI Broker	147
7.3.2. How to Set Up Oracle Secure Global Desktop and Access a Desktop Using Oracle Secure Global Desktop Application Objects	149
7.4. Remote Desktop Client (RDC)	150
7.4.1. About the Bundled RDP Broker	150
7.4.2. How to Access Desktops with Microsoft RDC	151
7.5. Logging Out of Desktop Sessions	153
8. Performance and Tuning	155
8.1. Introduction to Oracle VDI Performance and Tuning	155
8.2. Oracle VDI Hosts	157
8.2.1. Sizing Guidelines for Oracle VDI Servers	157
8.2.2. Controlling the Number of Sessions on an Oracle VDI Host	157
8.3. Virtualization Hosts	157
8.3.1. Sizing Guidelines for Oracle VM VirtualBox Servers	157
8.4. Storage	158
8.4.1. Sizing Guidelines for Storage Servers	158
8.4.2. About ZFS Storage Caches	159
8.4.3. About Block Alignment	160
8.4.4. Oracle VDI Global Settings for Storage	163
8.4.5. Managing the ZIL on Oracle Solaris Platforms	164
8.5. Networking	165
8.5.1. How to Configure a Dedicated iSCSI Network	166
8.5.2. How to Configure Link Aggregation	166
8.5.3. How to Configure a VLAN	169
8.6. Virtual Machines	170
8.6.1. How to Configure Desktop Resources Per Pool (Oracle VDI Provider)	170
8.6.2. Optimizing Windows 7 Desktop Images	171
8.6.3. Optimizing Windows Vista Desktop Images	174
8.6.4. Optimizing Windows XP Desktop Images	177
8.6.5. Optimizing Desktop Images for Other Operating Systems	181
9. Monitoring and Maintaining Oracle VDI	183
9.1. How to Log in to Oracle VDI Manager	183
9.2. Oracle VDI Administrators	184
9.2.1. About Oracle VDI Role-Based Administration	184
9.2.2. How to Create Administrators and Assign Roles	186
9.3. Checking Oracle VDI Services and Logs	187

9.3.1. How to Check the Status of the Oracle VDI Center	187
9.3.2. How to Check the Oracle VDI Log Files	187
9.3.3. How to Change Logging for Oracle VDI	187
9.3.4. How to Check the Status of the Oracle VDI Database	189
9.3.5. How to Check the Status of the Oracle VDI Service	189
9.3.6. How to Check the Status of the Oracle VDI RDP Broker	190
9.3.7. How to Check the Status of the Oracle VDI Center Agent	190
9.3.8. How to Check the Status of the Oracle VDI Manager	190
9.3.9. How to Check the Status of Cacao and the Oracle VDI Modules	191
9.3.10. How to Restart Cacao	192
9.4. Backing Up and Restoring the Oracle VDI Database	192
9.5. About Desktop Provider Alarms	193
9.6. Maintenance Mode	194
9.6.1. Oracle VDI Hypervisor and Microsoft Hyper-V Host Maintenance	194
9.6.2. Storage Maintenance	195
9.7. Deleting Orphan Disks	196
9.8. Oracle VDI Centers and Failover	197
9.8.1. How to Change the Replication Database Host	197
9.8.2. How to Change the Primary Host in an Oracle VDI Center	198
9.8.3. How to Trigger Failover Manually	198
9.8.4. How to Remove an Unresponsive Host from an Oracle VDI Center	198
9.8.5. How to Tune Automatic Failover	199
9.9. Providing Feedback and Reporting Problems	200
9.9.1. Contacting Oracle Specialist Support	200
9.9.2. Support Bundles	200
10. Troubleshooting and FAQs	203
10.1. Installation and Configuration	204
10.1.1. Oracle VDI Configuration Is Failing to Import svc_vdadb.xml	204
10.1.2. Can I Try Out MySQL or Set up an Evaluation Oracle VDI Remote Database?	205
10.1.3. Do I Need to Configure Sun Ray Software Separately?	205
10.1.4. Reconfiguring Oracle VDI Fails With "Error While Configuring Database"	205
10.1.5. Oracle VDI Configuration Fails to Create Database Tables With Remote Windows Databases That Use UTF-8	206
10.2. User Directory	207
10.2.1. I Am Having Some Trouble With the User Directory. Can I Adjust the Log Level to Get More Information?	207
10.2.2. Kerberos Authentication to Active Directory Works for a While and Then Stops	207
10.2.3. Can I Use PKI Instead of Kerberos for Authentication to an Active Directory?	208
10.2.4. What Type of Privileged Access to the User Directory Is Required?	208
10.3. Oracle VDI Desktop Provider	208
10.3.1. Why Are My Windows 7 Audio Drivers Not Automatically Installed?	208
10.3.2. Oracle VM VirtualBox Install Is Failing With "Postinstall Script Did Not Complete Successfully" Errors	209
10.3.3. There Is an Error When I Add an Oracle VM VirtualBox Host to a Desktop Provider	209
10.3.4. The Oracle VM VirtualBox Web Service Cannot Be Contacted	210
10.3.5. Are all Oracle VM VirtualBox Releases Compatible With Oracle VDI?	210
10.3.6. How do I Change the Password on my Oracle VM VirtualBox Host?	210
10.3.7. I Can See My Oracle VM VirtualBox Hosted Desktop, But It Will Not Start	211
10.3.8. The Time in My Oracle VDI Hypervisor Desktop Is Too Slow	211
10.3.9. Can I Run More Than 100 Virtual Machines on a Single Oracle VM VirtualBox Server?	212
10.3.10. What Are the Requirements for High Availability for Oracle VM VirtualBox?	212
10.3.11. How Do I Change the Password of the Oracle VM VirtualBox Service?	213

10.4. VMware vCenter Desktop Provider	213
10.4.1. Is VMware ESXi a Supported Virtualization Platform?	213
10.4.2. I Cannot Log into My VMware Virtual Machine	213
10.4.3. Users Cannot Log Into Their VMware Provided Windows desktop	213
10.4.4. Why Does My VMware Virtual Machine Have an Invalid IP Address Or Cannot Be Pinged?	213
10.4.5. I Am Unable to Get a MS RDC Connection on My VMware Virtual Machine	213
10.4.6. Creating a vCenter Desktop Provider Fails With "Unable to Contact VMware VirtualCenter - Host Not Reachable at Port 443" Errors	214
10.4.7. In My VMware Desktop Pool, New Virtual Machines Are Created Automatically, But They Are Not Made Available	214
10.4.8. The VMware Virtual Machine Cloning Process Is Not Operating As Expected	214
10.4.9. The Window Displaying the VMware-Hosted Virtual Desktop Is Freezing	215
10.4.10. I Have Created a New Pool in My VMware Desktop provider and Virtual Machines Are Not Created Automatically	216
10.4.11. How Do I Use VMware Virtual Machines With Multiple Network Adapters?	216
10.4.12. Unused VMware Virtual Machines Are Not Being Recycled	217
10.5. Microsoft Hyper-V and RDS Desktop Providers	218
10.5.1. Sessions Are Started by Oracle VDI on RDS Hosts That Do Not Participate in the Microsoft Remote Desktop Provider. Why Is That Happening?	218
10.5.2. Hyper-V Desktop Cloning Fails With "Cannot Reload MSiSCSI Target List" Errors.	218
10.5.3. Can I Enter the Farm Information for the Microsoft Remote Desktop Provider and let Oracle VDI Detect the Individual RDS Hosts Participating in the Farm?	219
10.5.4. Oracle VDI Is Not Able to Communicate With the Windows Server	219
10.5.5. Connection Problems between Oracle VDI and Hyper-V	219
10.6. Desktops and Pools	220
10.6.1. How Do I Make a Desktop Available to a User at All Times?	220
10.6.2. Starting a Desktop Fails With "No suitable Hosts to Start a Desktop for Desktop Provider <Name>" Errors	220
10.6.3. What Is the Difference Between Personal and Flexible Desktop Assignments?	220
10.6.4. Oracle VDI Fast Preparation Is failing	221
10.6.5. Can I Use Wild Cards in Token Names to Represent a Group of Thin Clients in Order to Assign These Thin Clients to a Pool?	221
10.6.6. The Audio in My Ubuntu Desktop Is Playing Too Slowly. What Should I Do?	222
10.6.7. Audio Does Not Play After Changing the Audio Configuration for Oracle VM VirtualBox Hosted Desktops in Oracle VDI Manager	222
10.6.8. How Do I Specify USB Redirection for Sun Ray?	222
10.6.9. What Are the Differences Between MS-RDP and VRDP?	222
10.6.10. Cloning Fails if the Sysprep Timezone Setting Does not Match the Host Timezone	222
10.7. Logging In and Accessing Desktops	223
10.7.1. Users Cannot Access Their Desktops	223
10.7.2. A User Can Log in But Their Desktop is Not Responding	223
10.7.3. Error - "Currently There Is No Desktop Available Or Assigned to You"	224
10.7.4. Is It Possible to Customize the Desktop Login Screen?	225
10.7.5. The Sun Ray Client Is Cycling and Cannot Connect to a Virtual Machine	226
10.7.6. Users Cannot Log in to Ubuntu 8.04 Desktops Because the Network Is Not Enabled	226
10.7.7. How Do I Control Which Sun Ray Server Users Are Redirected to When Disconnected From Their Kiosk Session?	227
10.8. Administration Tools	227
10.8.1. I Cannot Log in to Oracle VDI Manager	227
10.8.2. I Get a Blank Screen After Successfully Logging into the Oracle VDI Manager	227

10.8.3. Error - "You Have Been Logged out Because a Consistent Response Could Not Be Guaranteed"	228
10.8.4. How Can I Change the Password of an Oracle VDI Host?	228
10.8.5. How Do I Change the Password of a Remote MySQL Database?	228
10.8.6. Does the MySQL Database Store All Sun Ray Software Configuration?	228
10.8.7. The vda Command Reports That Oracle VDI Is Not Running Although cacoadm and vda-db-status Say It Is	229
10.8.8. Users Do Not Show Up in Users and Groups in Oracle VDI Manager	229
10.8.9. Is There a Way to Modify the Cacao Logging Behavior So That a Long History Can Be Maintained?	229
10.8.10. Jobs Do Not Finish Even After Canceling Them Using Oracle VDI Manager	229
10.8.11. Can I Adjust the Logging Level for the Oracle VDI Logs?	229
10.8.12. How Do I Log in to the Embedded MySQL Database?	229
10.9. Oracle VDI	230
10.9.1. Oracle VDI Hangs Intermittently When Running on x2270 Hardware	230
10.9.2. The System Is Not Reacting as Expected	230
10.9.3. How Do I Configure DHCP in Oracle VDI?	231
A. Automated Administration Scripts	233
A.1. Reading the Return Code	233
A.2. Waiting for a Job to Finish	233
A.3. Parsing the Output of the CLI	234
A.3.1. Subcommands That Result in a Single Job	234
A.3.2. Subcommands That Result in a Multiple Jobs	235
A.3.3. user-search	235
A.3.4. user-show	236
A.3.5. user-desktops	236
A.3.6. group-list	236
A.3.7. group-show	236
A.3.8. token-search	237
A.3.9. token-show	237
A.3.10. token-desktops	237
A.3.11. pool-list	237
A.3.12. pool-show	238
A.3.13. pool-desktops	238
A.3.14. pool-templates	239
A.3.15. desktop-search	239
A.3.16. template-revisions	239
A.3.17. provider-list	240
A.3.18. provider-list-hosts	240
A.3.19. provider-list-storage	240
A.3.20. provider-list-templates	241
A.3.21. provider-list-unmanaged	241
A.3.22. provider-list-networks	242
A.3.23. provider-show	242
A.3.24. provider-storage-orphans	244
A.3.25. directory-list	244
A.3.26. admin-list	245
A.3.27. admin-show	245
A.3.28. role-list	245
A.3.29. job-list	245
A.3.30. job-show	246
B. Defaults for the Software Bundled With Oracle VDI	247
B.1. Sun Ray Windows Connector	247
B.2. Sun Ray Software	248

B.3. Oracle VDI	249
C. User Directory LDAP Filters and Attributes	251
C.1. How to Edit LDAP Filters and Attributes	251
C.2. LDAP Filters and Attributes for Users, Groups, and Containers	252
C.2.1. Default LDAP Filters and Attributes for Users, Groups and Containers	253
C.2.2. Active Directory Settings for Users, Groups, and Containers	254
C.2.3. Oracle Directory Server Enterprise Edition Settings for Users, Groups, and Containers	254
C.2.4. OpenDS Settings for Users, Groups, and Containers	255
C.2.5. OpenLDAP Settings for Users, Groups, and Containers	255
C.2.6. Novell eDirectory Settings for Users, Groups, and Containers	256
C.3. LDAP Filters and Attributes for Global Oracle VDI Centers	256
C.3.1. Default LDAP Filters and Attributes for Global Oracle VDI Centers	257
C.3.2. Active Directory Settings for Global Oracle VDI Centers	257
C.3.3. Oracle Directory Server Enterprise Edition Settings for Global Oracle VDI Centers...	257
D. Remote Database Configuration	259
D.1. How to Install and Configure a Remote MySQL Database (InnoDB)	259
D.2. How to Create a Privileged Database Administrator	261
E. Glossary	263
F. Licenses for Third-Party Components	267
F.1. Apache Software Foundation Licenses	267
F.2. Bouncy Castle License	272
F.3. EclipseLink License	272
F.4. Java Secure Channel (JSCH) for SSH2 License	273
F.5. WSDL4J License	273
F.6. Xerces License	274

Preface

Oracle Virtual Desktop Client software is an included component of Oracle's Sun Ray Software and Oracle Virtual Desktop Infrastructure software products that must be separately downloaded from Oracle Software Delivery Cloud (<https://edelivery.oracle.com>). Use of Oracle Virtual Desktop Client is subject to the Oracle software license agreement provided with and/or applying to Sun Ray Software and Oracle Virtual Desktop Infrastructure.

The *Oracle Virtual Desktop Infrastructure Administrator's Guide for Release 3.3* is a comprehensive guide to how to install, configure, and administer Oracle Virtual Desktop Infrastructure (VDI). Troubleshooting information is also included.

Audience

This document is written for system administrators who want to install and configure Oracle VDI in order to deploy desktops to users. It is assumed that readers are familiar with web and virtualization technologies and have a general understanding of operating systems such as UNIX (including Linux) and Windows.

Document Organization

The document is organized as follows:

- [Chapter 1, Release Notes](#) provides a summary of the new features, changes, and known issues in this release.
- [Chapter 2, System Overview of Oracle Virtual Desktop Infrastructure](#) provides an overview of the Oracle VDI system and its components.
- [Chapter 3, Installing Oracle VDI and Configuring Oracle VDI Centers](#) describes how to install Oracle VDI software and configure hosts to form Oracle VDI Centers.
- [Chapter 4, Configuring Companies and User Directories](#) describes how to integrate Oracle VDI with the user directories used in your organization. Oracle VDI uses the information in a directory to assign desktops to users.
- [Chapter 5, Configuring Desktop Providers and Virtualization Platforms](#) describes how to configure the virtualization platforms that run the desktops provided by Oracle VDI.
- [Chapter 6, Preparing Desktops](#) describes how to prepare the desktops that are deployed through Oracle VDI and how to assign them to users.
- [Chapter 7, Accessing Desktops](#) describes how to provide access to the desktops deployed through Oracle VDI.
- [Chapter 8, Performance and Tuning](#) contains guidelines for sizing Oracle VDI systems and configuration tips for obtaining the best performance.
- [Chapter 9, Monitoring and Maintaining Oracle VDI](#) contains common tasks for day-to-day administration of Oracle VDI systems.
- [Chapter 10, Troubleshooting and FAQs](#) contains answers to common questions and problems when using Oracle VDI.
- The appendices and Glossary contain reference material.

Documentation Accessibility

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

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Related Documents

The documentation for this product and related products is available at:

- Oracle Virtual Desktop Infrastructure: <http://www.oracle.com/technetwork/server-storage/virtualdesktop/overview>.
- Oracle VM VirtualBox: <http://www.oracle.com/technetwork/server-storage/virtualbox/overview>.
- Sun Ray Software: <http://www.oracle.com/technetwork/server-storage/sunrayproducts/overview>.
- Oracle Secure Global Desktop: <http://www.oracle.com/technetwork/server-storage/securedesktop/overview>.

Conventions

The following text conventions are used in this document:

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

Document Revision

Document generated on: 2012-08-09 (revision: 1176)

Chapter 1. Release Notes

Table of Contents

1.1. New Features in Oracle VDI Release 3.3	1
1.2. VDA Subcommands, Arguments, and Properties Deprecated in Oracle VDI Release 3.3	3
1.2.1. Password Properties	3
1.2.2. Pool Settings	3
1.2.3. User Directory Settings	4
1.2.4. Remote Access Subcommands	6
1.2.5. Forced Deletion of a User Directory	6
1.3. About the Oracle VDI Package Software	6
1.3.1. Oracle VDI Requirements and Platform Support	7
1.3.2. Additional Supporting Software	7
1.4. Known Issues	8
1.4.1. Templates Cannot be Imported for Hyper-V Desktop Providers on Oracle Linux Platforms (Bug ID 12307034)	8
1.4.2. On Oracle Linux Platforms the GDM Greeter is Visible Until the Kiosk Session is Initialized (Bug ID 12577080)	8

1.1. New Features in Oracle VDI Release 3.3

Oracle VDI release 3.3 contains the following new features:

- **Support for Oracle Linux platforms**

Oracle Linux 5.6 is now a supported installation platform for Oracle VDI and the Oracle VDI Hypervisor. Support is only for 64-bit platforms, 32-bit platforms are not supported. For Oracle VDI servers, all hosts in an Oracle VDI Center must use the same operating system.

For details of other requirements for Linux platforms, see [Oracle VDI hosts](#) and [Oracle VDI Hypervisor](#).

- **High availability configuration with just two servers**

The bundled MySQL Cluster database used in previous releases is replaced with an embedded MySQL Server database. The change means that high availability configuration is now possible with just two hosts in an Oracle VDI Center. High availability is automatically enabled as soon as a secondary host is added to the Oracle VDI Center. Asynchronous replication is used between the master database on the primary Oracle VDI host and the slave database on the secondary host. Additional secondary hosts in an Oracle VDI Center have no database role.

For more details, see [Section 3.1.2, “High Availability Configuration Using Embedded MySQL Server”](#).

If you are updating from a previous release, [Section 3.8, “Updating Oracle VDI to Release 3.3”](#) has details of the configuration changes that take place when you update.

- **Support for installation in virtualized hosts**

Oracle VDI can now be installed in virtualized hosts.

For important considerations when using virtualized hosts, see [Section 3.4, “Oracle VDI Centers in Virtualized Environments”](#).

- **Simplified installation and update**

The installation and update process has been simplified and there is no longer a requirement to reboot after installing the software.

For more details, see [Section 3.5, “How to Install Oracle VDI”](#) and [Section 3.8, “Updating Oracle VDI to Release 3.3”](#).

- **Role-based administration**

This release introduces role-based administration. There is a pre-defined set of roles that enable you to control access to companies and desktop providers. Users can have read or write access to an area. In Oracle VDI Manager, the top-level categories are only shown if your role has access to that area. On the command line, the `vda` command and subcommands can be run by non-root users. Non-root users are prompted for a password every time they run a command. It is not possible to add your own roles.

For more details, see [Section 9.2, “Oracle VDI Administrators”](#).

- **New Sun Ray Kiosk Session desktop provider**

There is a new desktop provider that enables you to use an existing Sun Ray Kiosk Mode session type instead of a regular Oracle VDI desktop. Sun Ray Kiosk Session providers enable you to provide access to types of sessions that are not available with Oracle VDI itself, for example to connect to a remote desktop using a different broker such as the Sun Ray VMware View connector, or to provide access to a web-based application in a locked-down web browser.

For more details, see [Section 5.5, “About Sun Ray Kiosk Session Providers”](#)

- **Support for VMware linked cloning**

This release includes support for VMware linked cloning. Linked cloning enables multiple virtual machines to share virtual disks with a parent virtual machine and use the same software installation. Linked clones also conserve disk space and can be created more quickly than full clones.

For more details to how to enable support for linked clones, see [Section 6.7.3, “How to Enable VMware Linked Cloning”](#).

- **Simplified configuration for Remote Desktop Services farms**

For Remote Desktop Services hosts that are part of a farm or NLB cluster, Oracle VDI no longer requires additional configuration of the Remote Desktop Server host (using `ws-man`).

For more details, see [Section 5.2.2.4, “Microsoft Remote Desktop Provider RDS Farm Management”](#).

- **User desktop reset**

Users can now restart their own desktops without any administrator or call center involvement. The Desktop Selector has a reset button the enables users to select a desktop and reset it.

For more details, see [Section 10.7.2, “A User Can Log in But Their Desktop is Not Responding”](#).

- **Web service API**

Oracle VDI now includes a web service interface for easier integration with third-party tools. It enables you to query, start, and reset the desktops assigned to a user.

- **Support bundles**

Oracle VDI can generate support bundles containing log files and important system configuration. This information can be used by Oracle Support to analyze and diagnose system issues.

For more details, see [Section 9.9.2, “Support Bundles”](#)

1.2. VDA Subcommands, Arguments, and Properties Deprecated in Oracle VDI Release 3.3

This section lists the VDA subcommands, arguments, and properties that are deprecated in Oracle VDI release 3.3.

The deprecated items still work as in the previous release of Oracle VDI. However, because these items might not be available in a future release of Oracle VDI, it is best to stop using them as soon as possible.

1.2.1. Password Properties

All properties that provide passwords for subcommands have been are deprecated. Passwords are now only provided when prompted.

Subcommand	Deprecated Password Property
<code>pool-create-sysprep</code>	<code>domain-password</code> and <code>admin-password</code>
<code>pool-create-fastprep</code>	<code>domain-password</code> and <code>admin-password</code>
<code>provider-vc-create</code>	<code>password</code>
<code>provider-vc-setprops</code>	<code>password</code>
<code>provider-add-host</code>	<code>password</code>
<code>provider-host-setprops</code>	<code>password</code>
<code>provider-add-storage</code>	<code>password</code>
<code>provider-replace-storage</code>	<code>password</code>
<code>provider-storage-setprops</code>	<code>password</code>
<code>directory-add</code>	<code>password</code>
<code>directory-setprops</code>	<code>password</code>

For the above commands, when specifying a username property, the command automatically prompts for the corresponding password.

For the `provider-vc-setprops`, `provider-host-setprops`, `provider-storage-setprops`, and `directory-setprops` subcommands, if you only want to update the password without changing the username, use the `password-prompt` property.

1.2.2. Pool Settings

The pool Sun Ray setting `hotdesking` is replaced by `hotdesking-action`.

```
# sbin/vda pool-setprops --help
Edit the properties of the pool

Usage:
vda pool-setprops [-p <prop1>=<value1>,<prop2>=<value2> |
                  --properties=<prop1>=<value1>,<prop2>=<value2>] [-u <userdir>
                  | --userdir=<userdir>] <name>
-?, --help          Print this help list
```

```
Options:
*-p <prop1>=<value1>,<prop2>=<value2>, --properties=<prop1>=<value1>,<prop2>=<value2>
    The list of properties to set
-u <userdir>, --userdir=<userdir>
    The name of the user directory for the pool

Properties:
[...]
hotdesking=<hotdesking>    DEPRECATED: use the hotdesking-action property
                           instead.
                           Enable or disable optimized hotdesking behaviour for
                           Sun Ray client sessions. Valid values are 'enabled'
                           and 'disabled'
hotdesking-action=<hotdesking-action>
                           The Sun Ray Connector reconnection behavior on
                           hotdesking of Sun Ray client sessions. Valid values
                           are 'nodisconnect', 'reconnect' and 'autoreconnect'
[...]
```

1.2.3. User Directory Settings

User directory settings have moved from Global Settings ([settings-getprops](#), [settings-setprops](#), [settings-resetprops](#) subcommands) to User Directory Settings ([directory-getprops](#), [directory-setprops](#), [directory-resetprops](#) subcommands).

Oracle VDI 3.2.x Property Name in Settings Subcommands	Oracle VDI 3.3 Property Name in Directory Subcommands	Help Text
directory.white.list	whitelist	List of comma-separated Active Directory global catalog servers that are always used for LDAP queries. The order of the servers in the whitelist is important. If Oracle VDI cannot contact the first server in the list, it tries the next one
directory.black.list	blacklist	List of comma-separated Active Directory servers that are never used for LDAP queries (this overrides any whitelist settings)
directory.mail.domain	user.auth.mail.domain	Email domain for users of the user directory. For example, example.com. Allows users to log in with their e-mail address
directory.default.domain	user.auth.default.domain	The default authentication domain if authenticating users using email addresses
ldap.user.object.filter	ldap.user.object.filter	LDAP filter used to identify objects of type user
ldap.user.search.filter	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 placeholder for the search criteria

Oracle VDI 3.2.x Property Name in Settings Subcommands	Oracle VDI 3.3 Property Name in Directory Subcommands	Help Text
<code>ldap.user.member.attributes</code>	<code>ldap.user.member.attributes</code>	List of comma-separated LDAP attributes on a user object storing the groups the user is a member of
<code>ldap.userid.attributes</code>	<code>ldap.userid.attributes</code>	List of comma-separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid
<code>ldap.group.object.filter</code>	<code>ldap.group.object.filter</code>	LDAP filter used to identify objects of type group
<code>ldap.group.search.filter</code>	<code>ldap.group.search.filter</code>	LDAP filter used to search for groups according a search criteria. Searches for groups can be done using the <code>user-search</code> command or in the web administration console. <code>\$SEARCH_STRING</code> is the placeholder for the search criteria
<code>ldap.group.member.attributes</code>	<code>ldap.group.member.attributes</code>	List of comma-separated LDAP attributes on a group object storing the users member of the group
<code>ldap.group.short.attributes</code>	<code>ldap.group.short.attributes</code>	List of comma-separated LDAP attributes on a group object storing the information for short membership
<code>ldap.container.object.filter</code>	<code>ldap.container.object.filter</code>	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console
<code>ldap.container.search.filter</code>	<code>ldap.container.search.filter</code>	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. <code>\$SEARCH_STRING</code> is the placeholder for the search criteria
<code>ldap.default.attributes</code>	<code>ldap.default.attributes</code>	List of LDAP separated attributes loaded in the cache when looking up an object
<code>ldap.search.wildcard</code>	<code>ldap.search.wildcard</code>	Determines whether wildcards are used to extend the user or group searches. Valid values are <code>enabled</code> and <code>disabled</code> .
<code>ldap.vdicenter.displayname.attributes</code>	<code>ldap.vdicenter.displayname.attributes</code>	List of comma-separated LDAP attributes on an Oracle VDI

Oracle VDI 3.2.x Property Name in Settings Subcommands	Oracle VDI 3.3 Property Name in Directory Subcommands	Help Text
		Center object containing its display name
<code>ldap.vdihost.object.filter</code>	<code>ldap.vdihost.object.filter</code>	LDAP filter used to match Oracle VDI host objects inside the Oracle VDI Center
<code>ldap.vdihost.dnsname.attributes</code>	<code>ldap.vdihost.dnsname.attributes</code>	List of comma-separated LDAP attributes on an Oracle VDI host object containing its DNS name or IP address
<code>ldap.user.vdicenter.attributes</code>	<code>ldap.user.vdicenter.attributes</code>	List of comma-separated LDAP attributes on a User object containing its Oracle VDI Center DN

1.2.4. Remote Access Subcommands

The `remote-access-setprops` and `remote-access-getprops` subcommands are deprecated.

```
Remote Subcommands:
  remote-access-setprops:  DEPRECATED: Remote access is now possible using
                           the Webservice API.
                           Enable and disable remote access and specify the
                           listening port
  remote-access-getprops:  DEPRECATED: Remote access is now possible using
                           the Webservice API.
                           Displays remote access properties which include
                           enabled state and port
```

1.2.5. Forced Deletion of a User Directory

The `--force` option on the `directory-remove` subcommand no longer has any effect because pools must be deleted before a directory can be removed.

```
# sbin/vda directory-remove --help
Remove the user directory configuration from the system

Usage:
  vda directory-remove [-f | --force] [<userdir>]
  -?, --help          Print this help list
Options:
  -f, --force          DEPRECATED: pre-conditions to remove a user directory
                       have changed. It is not possible to remove user
                       directories which have pools.
                       Force removal of the user directory configuration
                       when the user directory is in use, because some users
                       are assigned to desktops or associated to tokens

Operand:
  <userdir>            The name of the user directory
  '*' denotes mandatory parameters.
```

1.3. About the Oracle VDI Package Software

Oracle VDI software is a layered software solution that makes use of virtualization, user directory, database, and desktop access software. For more information about the full Oracle VDI architecture, see [Section 2.1, "Introduction to Oracle Virtual Desktop Infrastructure"](#).

The software includes the following components:

- Oracle VDI 3.3
- Sun Ray Software 5.2.2
- MySQL Server 5.1.50
- Oracle VM VirtualBox 4.0.10

1.3.1. Oracle VDI Requirements and Platform Support

For details of the requirements for this release of Oracle VDI and what is supported in this release, see the following:

- [Oracle VDI installation requirements](#)
- [Oracle VDI update requirements](#)
- [Supported user directories](#)
- [Oracle VDI Hypervisor requirements](#)
- [Microsoft Hyper-V requirements](#)
- [Microsoft Remote Desktop Services requirements](#)
- [VMware vCenter requirements](#)
- [Supported storage platforms](#)
- [Supported desktop operating systems](#)

1.3.2. Additional Supporting Software

Additional software that can be used with Oracle VDI can be downloaded using the following links:

- [Oracle Linux](#)
- [Oracle Secure Global Desktop](#)
- [Oracle Solaris 10](#)
- [Oracle Virtual Desktop Client](#)

Oracle VM VirtualBox release 4.0 and later is divided into two components:

- The Base Pack contains open-source software and is licensed under the GNU General Public License V2.
- The Extension Pack extends the functionality of the Base Pack and contains Oracle proprietary software.

Oracle VDI only includes the Extension Pack for the Oracle Solaris and Oracle Linux platforms. When you run the script to install Oracle VM VirtualBox, the script automatically downloads the Base Pack. The Base Pack and Extension Pack can be downloaded from the [Oracle VDI download page](#). For more information, see [Section 5.1.4, "How to Install the Oracle VDI Hypervisor"](#).

Supporting Documentation

Further information about additional software can be found using the following links:

- [Sun Ray Software 5.2 documentation](#): release note, installation, configuration, and administration information for Sun Ray Software, Sun Ray Windows connector ([uttsc](#)), and Oracle Virtual Desktop Client.
- [Oracle Secure Global Desktop 4.6 documentation](#): release note, installation, configuration, and administration information for Oracle Secure Global Desktop.
- [Oracle VM VirtualBox documentation](#): user and developer documentation for Oracle VM VirtualBox.

1.4. Known Issues

1.4.1. Templates Cannot be Imported for Hyper-V Desktop Providers on Oracle Linux Platforms (Bug ID 12307034)

For Oracle VDI on Oracle Linux platforms, the `iscsi-initiator-utils` package is a required package. This package is used to create the iSCSI initiator file `/etc/iscsi/initiatorname.iscsi`. If this file is missing, or it is empty, it results in a database entry with an empty value in a non-empty constrained field and this causes a `NullPointerException` when importing a template for Hyper-V desktop providers.

The workaround is as follows:

1. Check that the iSCSI initiator file exists and that it is not empty.

Use the `cat` command to check the contents of the file. The following is an example of a correctly configure file.

```
# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1994-05.com.redhat:bd25643d1f24
```

2. Create the iSCSI initiator file.

You can create the iSCSI initiator file by installing or re-installing the `iscsi-initiator-utils` package, or it can be generated on the command line.

If you install the `iscsi-initiator-utils` package from a separately-provided `.rpm` file, do not use the `--noscript` option when you install it, as this prevents some required files from being installed. Install the package by running the following command as root:

```
# rpm -ivh --nosignature iscsi-initiator-utils-<version>.rpm
```

To generate the file on the command line, run the following command as root:

```
# printf "InitiatorName=`iscsi-iname`\n" > /etc/iscsi/initiatorname.iscsi
```

3. Restart the iSCSI daemon.

Run the following commands as root:

```
# /etc/init.d/iscsi stop
# /etc/init.d/iscsi start
```

1.4.2. On Oracle Linux Platforms the GDM Greeter is Visible Until the Kiosk Session is Initialized (Bug ID 12577080)

This behavior can be prevented by editing the Greeter key in the GDM configuration file.

1. Edit file `/etc/gdm/custom.conf` file.

2. Locate the `[daemon]` section and replace the Greeter key.

Change the line:

```
Greeter=/usr/libexec/gdmgreeter
```

to:

```
Greeter=/opt/SUNWkio/lib/gdm/kioskgreeter /usr/libexec/gdmgreeter
```


Chapter 2. System Overview of Oracle Virtual Desktop Infrastructure

Table of Contents

2.1. Introduction to Oracle Virtual Desktop Infrastructure	11
2.1.1. About Virtualization	12
2.1.2. About Storage	13
2.1.3. About Management	14
2.1.4. About Desktop Access	16

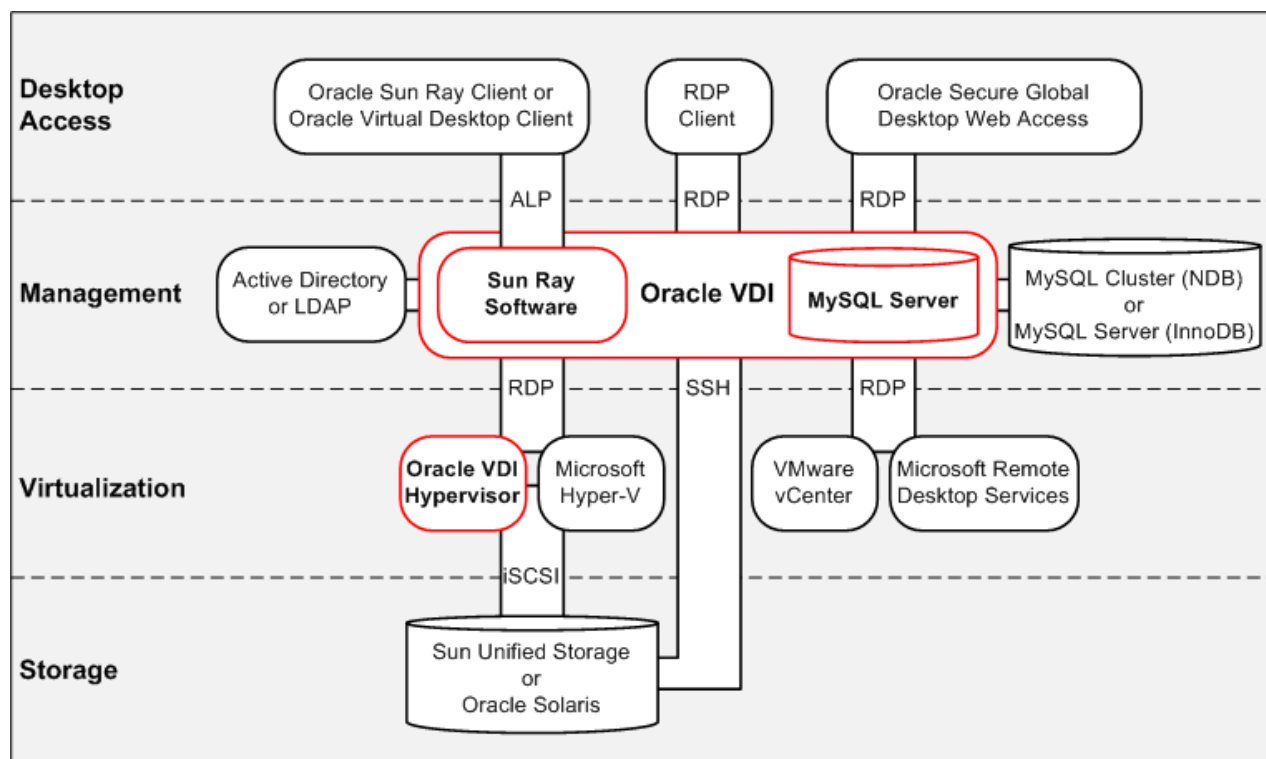
2.1. Introduction to Oracle Virtual Desktop Infrastructure

Oracle Virtual Desktop Infrastructure (VDI) provides access to virtualized desktops hosted in a data center. Oracle VDI can provide a complete desktop provisioning and delivery service by:

- Creating, running, and storing virtual machines.
- Authenticating users and connecting them to their virtualized desktops.
- Enabling client devices to display virtualized desktops.

The four elements of an Oracle VDI system are virtualization, storage, management and desktop access, as shown in [Figure 2.1, “Oracle VDI Architecture”](#).

Figure 2.1. Oracle VDI Architecture



The following sections describe these elements.

2.1.1. About Virtualization

Virtualization is the basis of Oracle VDI because it provides the functionality for creating and managing desktops. A **desktop** is an instance of an operating system running on a virtualization platform. In Oracle VDI, a virtualization platform is configured as a **desktop provider**. When you configure a desktop provider, you specify the following:

- The provider type: This is the platform used to virtualize desktops.
- The provider hosts: The servers that actually run the desktops, and their associated storage.

Oracle VDI supports several types of desktop provider and the types can be divided into the following categories:

- Hypervisor-based providers: These provide access to desktops that are virtual machines hosted by a bare metal hypervisor such as a VMware ESX server, or a hosted hypervisor such as Oracle VM VirtualBox.
- Session-based providers: These provide access to desktop sessions that are hosted by remote computers, such as Microsoft Remote Desktop Services (RDS).

The provider hosts configured for a desktop provider are installed separately from Oracle VDI and run on their own platforms. The provider hosts provide the physical resources for running desktops, such as CPU and memory, as well as the means for managing desktops. The storage used by the provider hosts is discussed in [Section 2.1.2, “About Storage”](#).

Oracle VDI does not restrict you to a single virtualization platform. You can use a mixture of desktop provider types and create as many desktop providers as you need. How Oracle VDI interacts with a desktop provider depends on the provider type, and is described in more detail in the following sections.

Hypervisor-Based Desktop Providers

The following are the available hypervisor-based desktop providers:

- Oracle VDI
- Microsoft Hyper-V
- VMware vCenter

The Oracle VDI desktop provider uses Oracle VM VirtualBox as the virtualization platform, and the Oracle VM VirtualBox software is distributed with Oracle VDI. Unlike the other desktop providers, Oracle VM VirtualBox enables you to run UNIX and Linux platform desktops as well Windows desktops. Oracle VM VirtualBox also has its own integrated server for the Remote Desktop Protocol (RDP) that enables you to connect to, and control, a remote virtual machine as though it was running locally.

With the Oracle VDI and Microsoft Hyper-V desktop providers, Oracle VDI directly manages the provider hosts. Oracle VDI sends requests to register desktops with a provider host, including the configuration information for the virtual machines, and sends requests to manage those desktops, for example to start, stop, and preserve the state of desktops. For Oracle VDI providers, Oracle VDI uses the Oracle VM VirtualBox web services application programming interface (API) to communicate with the provider hosts. For Microsoft Hyper-V providers, Windows Remote Management (WinRM) is used. The communication between Oracle VDI and a provider host takes place over secure Hypertext Transfer Protocol (HTTPS) connections. There is no limit on the number of hosts these desktop providers can have, and to ensure best performance, Oracle VDI balances the desktop load across the available hosts.

When you configure a VMware vCenter desktop provider, you specify a VMware vCenter server rather than individual provider hosts because the provider hosts are managed by the VMware infrastructure. Oracle VDI sends requests for desktops to the vCenter server, and the vCenter server sends the request to a vSphere server in the group. Oracle VDI uses the VMware Infrastructure SDK web services API to communicate with the vCenter server and the communication takes place over HTTPS. Although the VMware infrastructure is responsible for all desktop operations, Oracle VDI is able to monitor the load and choose a particular datastore to use when creating a desktops.

Session-Based Desktop Providers

The following are the available session-based desktop providers:

- Microsoft Remote Desktop
- Sun Ray Kiosk
- Generic

The Microsoft Remote Desktop provider does not provide individual desktops, instead Oracle VDI connects users to desktop sessions created on RDS servers. The provider host can be a single stand-alone RDS server or a group of servers in an RDS farm. The RDS server or farm is responsible for creating new RDS desktop sessions for users, or for reconnecting users to their existing desktop sessions (if Session Broker is configured), and for load balancing the sessions. Optionally, you can configure the RDS servers so that Oracle VDI can display session, CPU, and memory load information, in the Oracle VDI administration tools.

The Sun Ray Kiosk desktop provider provides access to types of sessions that are not available with Oracle VDI itself, for example to connect to a remote desktop using a different broker such as the Sun Ray VMware View connector, or to provide access to a web-based application in a locked-down web browser.

Generic desktop providers run RDS desktop sessions on physical computers or virtual machines. Typically the Generic provider is used by Oracle VDI to connect users to existing Windows PCs, and is used as part of a strategy for migrating desktops to the Oracle VDI solution.

2.1.2. About Storage

Storage is closely related to virtualization because usually a desktop provider requires somewhere to create and store the virtual disks used for desktops. The format used for the virtual disks is the native format supported by the virtualization platform. The storage requirements, and how the storage is managed, depend on the desktop provider type.

The Oracle VDI and Microsoft Hyper-V desktop providers require storage. Oracle VDI supports Zettabyte File System (ZFS) storage pools on Sun Unified Storage Systems or Oracle Solaris hosts, and Oracle VDI directly manages the storage it requires.

VMware vCenter desktop providers also require storage but the storage is managed by the VMware infrastructure and not Oracle VDI. However, Oracle VDI is able to query vCenter for the available storage, and can select the data store to use when creating virtual disks.

For all other desktop providers, storage is managed independently of Oracle VDI.

To provide for high availability, a desktop provider can be configured to use more than one storage server. With Sun Unified Storage Systems, you can also create storage clusters to provide redundancy for the hardware components of a storage server.

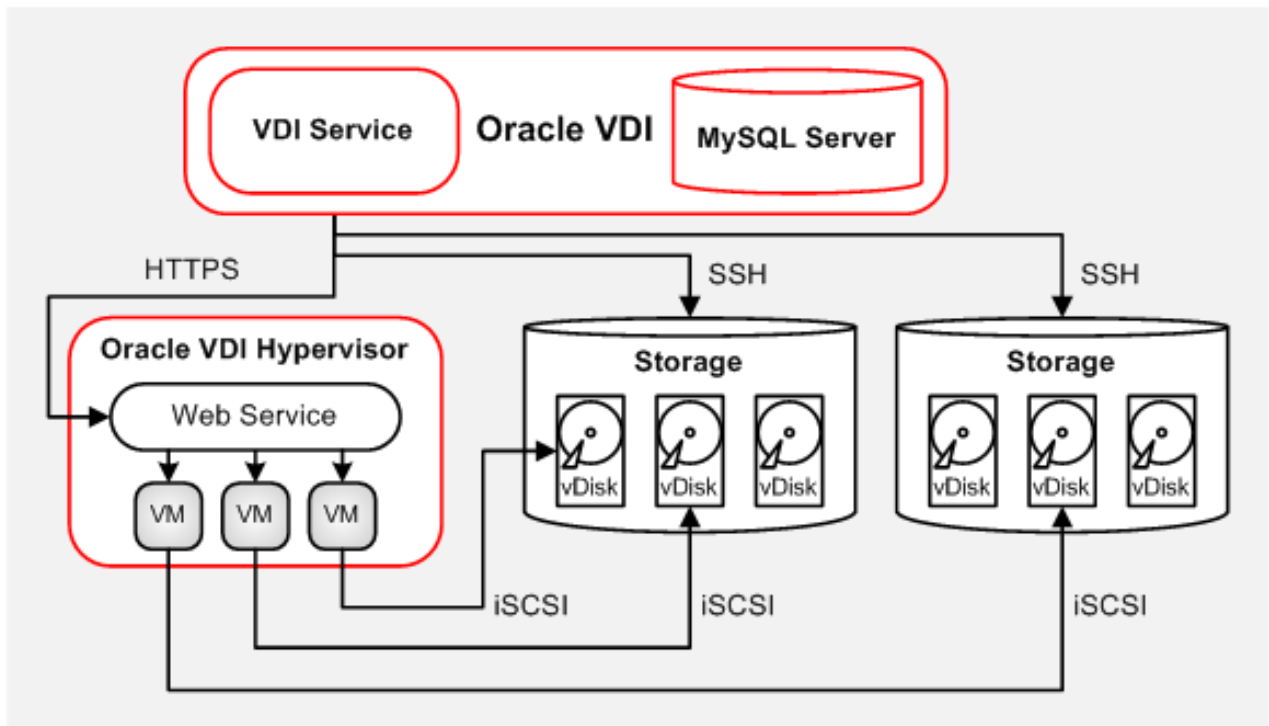
To provide the best performance and to balance the load, Oracle VDI selects a storage server to clone and host virtual disks based on the available free space and current workload. Once a virtual disk is created, it remains on the storage server until it is deleted.

How Oracle VDI Manages Storage

In order to create the virtual disks needed for desktops, Oracle VDI requires SSH root access to a storage server. On Sun Unified Storage Systems, the Sun Unified Storage command line is used to clone the virtual disks and store them in ZFS pools. On Oracle Solaris hosts, ZFS commands are used to perform these tasks. Each virtual disk is configured as an iSCSI target on the storage server.

When a user requests a desktop, Oracle VDI registers a virtual machine with a desktop provider host and this includes the iSCSI target address of the virtual disk. When the desktop provider starts the desktop, iSCSI is used to connect the desktop to its virtual disk, as shown in [Figure 2.2, “Storage and Oracle VDI”](#). This enables the virtual machine to access a virtual disk as if it was located in a local file system.

Figure 2.2. Storage and Oracle VDI



An Administrator can enable maintenance mode for a storage server. In this mode, the storage server is disabled and all running desktops are either shutdown or suspended. Once this mode is enabled, maintenance can take place on the storage server. This mode is also useful for replicating and replacing a storage server, for example to replace hardware.

2.1.3. About Management

The management element is the main part of Oracle VDI. This element provides all the functionality needed to build large-scale virtual machine deployments, and to provide users with access to their desktops. It contains the following components:

- VDI Service
- Oracle VDI Center Agent
- Oracle VDI Web Server
- MySQL Database

- RDP Broker
- Sun Ray Software

The RDP Broker, and Sun Ray Software components provide the means for users to access their desktops, and these are discussed in [Section 2.1.4, “About Desktop Access”](#). The following sections describe the purpose of the other components.

VDI Service

The VDI Service is the most important component of the Oracle VDI. It is used to create and manage desktop providers and desktops, and to authenticate users and assign desktops to them. The VDI Service is deployed as the vda module in the Common Agent Container (Cacao), which is a system daemon for running Java management applications. Sometimes the VDI Service is referred to as the VDA Service.

With Oracle VDI, desktops are organized into **pools**. A pool is a group of desktops hosted by a particular desktop provider type. Individual desktops can be imported into a pool, or a desktop can be imported as a **template** which is then cloned to create the required number of desktops. Pools are also used to apply a group of configuration settings to all the desktops in the pool, for example to specify the subnet on which the desktops are placed, or to control the resources used by the virtual machines.

The desktops in a pool are one of the following types:

- **Personal**: These desktops are assigned to individual users and are owned by them until the desktop is either deleted or assigned to another user by an Administrator.
- **Flexible**: These desktops are temporarily assigned to individual users. Once a user logs out, or the desktop is no longer in use, the desktop is either recycled so that it can be assigned to another user or deleted.

The VDI Service can be configured to manage the complete lifecycle of a desktop by:

- Creating the virtual machine
- Starting the virtual machine
- Assigning the desktop to a user
- Monitoring the usage of the desktop and the state of the virtual machine
- Recycling the desktop
- Shutting down the virtual machine
- Deleting the virtual machine

Oracle VDI can make use of data held in external user directories to authenticate users and assign desktops to them. This enables you to assign individual desktops or pools to the existing users and groups within your organization. The VDI Service supports Active Directory and LDAP-type directories. Multiple directories can be configured and this enables you to provide desktops to multiple companies from a single Oracle VDI deployment, or to integrate with companies that have complex Active Directory structures such as multiple tree forests with multiple domains. It is also possible to assign desktops to users using smart cards (Oracle VDI calls these tokens). Tokens and user directories can be used together, or independently.

Oracle VDI has two tools for configuring and managing the VDI Service:

- **Oracle VDI Manager**: This is a web-based graphical application.

- The `vda` command: This is a command-line tool with a family of sub-commands for managing the individual areas such as desktop providers and pools.

The VDI Service itself can only be started and stopped from the command line, using the `vda-service` command.

Oracle VDI Center Agent

The Oracle VDI Center Agent is deployed as the `vda.center.agent` module in the Common Agent Container (Cacao). It enables Oracle VDI to scale up to support more users, and to provide a reliable and highly available service.

Oracle VDI hosts can be joined together to form an Oracle VDI Center. The first host that is configured forms the Oracle VDI Center and this host is known as the primary host. Additional hosts are configured and added to the Oracle VDI Center as secondary hosts. The Oracle VDI Center Agent provides secure communication between the hosts in the Oracle VDI Center and is responsible for co-ordinating the information about the Oracle VDI Center among the hosts.

An Oracle VDI Center that has more than one host is able to provide a reliable service because the desktop sessions can be distributed between the hosts. If one host fails another one continues to host desktop sessions with only a minimal interruption to the user. If the primary host becomes unavailable, the Oracle VDI Center Agent automatically promotes a secondary host to become the new primary host, and communicates these changes to the other hosts in the Oracle VDI Center. This is known as failover.

MySQL Database

Oracle VDI requires a MySQL database to store configuration and run-time information. When you configure an Oracle VDI Center, you can choose to use the embedded MySQL Server database that is included with the Oracle VDI software, or you can use your own MySQL database.

If you use the embedded MySQL database, the primary host in the Oracle VDI Center runs the Oracle VDI master database. To provide for high availability, a secondary host in the Oracle VDI Center runs a slave database that receives replication updates from the primary host. If the primary host becomes unavailable, the Oracle VDI Center Agent automatically promotes the secondary host to become the primary host, and its database becomes the master database. If you use your own MySQL database, you must make your own provision for high availability.

The configuration data stored in the database includes the information about user directories and tokens, desktop information such as desktop providers, pools, templates, and storage. The run-time information includes information about the users that are logged in, the desktops they are using, the state of the desktops, and details of cloning jobs that are running.

Oracle VDI Web Server

The Oracle VDI Web Server is an Apache Tomcat server that is used to run the graphical administration tools used with Oracle VDI. In addition to Oracle VDI Manager, there is also the Sun Ray Administration tool. Each administration tool uses its own Tomcat instance and is accessed using a different port number.

The Oracle VDI Web Server also runs the Oracle VDI web services, which are described in [Section 2.1.4, “About Desktop Access”](#).

2.1.4. About Desktop Access

With Oracle VDI, desktop sessions always run on the virtualization host and never on the client devices. Users can access their desktops using any of the following clients:

- Oracle Sun Ray Clients, including Oracle Virtual Desktop Clients
- Remote Desktop Protocol (RDP) clients, including secure web access using Oracle Secure Global Desktop
- Web services clients, typically web applications

All requests for access to a desktop are handled by the VDI Service. Once a user has a desktop, the RDP protocol is used to connect to, and display, the desktop session. How users access their desktops depends on the client used to access a desktop, and is described in the following sections.

Oracle Sun Ray Clients

Users can access a desktop using an Oracle Sun Ray Client, or an Oracle Virtual Desktop Client. A Sun Ray Client is a secure, low-power, hardware thin client device for displaying desktops hosted on a server. The Oracle Virtual Desktop Client is an application that installs on common client operating systems, and is a software version of a Sun Ray Client. Both of these clients use the Appliance Link Protocol (ALP) to connect to the Sun Ray Software which runs on an Oracle VDI host.

The Sun Ray Software provides the infrastructure for displaying desktops to Sun Ray Clients. The Sun Ray Software runs the Oracle VDI Kiosk Session, which in turn runs a desktop selector program and a Sun Ray Windows connector program. The desktop selector submits the user's credentials to the VDI Service and requests the desktops assigned to the user. The Sun Ray Windows connector is an RDP client for the Sun Ray environment and this connects the user to the virtual machine running the desktop. Users access their desktops by authenticating themselves with a user name, password, and optionally a Windows domain, or by inserting a smart card. If the authentication succeeds, the user is connected to their desktop. If a user is assigned more than one desktop, a screen is displayed that enables them to select the desktop to connect to. The user's credentials can also be passed to a Windows operating system so that the user can be automatically logged into their desktop.

RDP Clients

Oracle VDI includes an RDP Broker that enables RDP clients to connect to a desktop using the Remote Desktop Protocol. Supported RDP clients include the Remote Desktop Client included with Oracle Secure Global Desktop, or Microsoft Remote Desktop Connection.

Users access their desktop by running an RDP client and specifying an Oracle VDI host to connect to. The RDP Broker accepts the incoming request, which includes a user name, password, and optionally a domain name, and runs the VDI Client command line tool, which authenticates the user and requests a desktop. The VDI Service returns the IP address and port of the desktop to the VDI Client tool, which passes this information to the RDP Broker. The RDP Broker redirects the RDP Client to connect to the desktop at the specified IP address and port.

Oracle Secure Global Desktop extends the reach of traditional RDP clients by providing users with secure access to a remote desktop using a browser.

Web Services Clients

The VDI Client command line tool has a web services application programming interface (API). Application developers and system integrators can use the HTTP and SOAP protocols to develop their own solutions for requesting a desktop from Oracle VDI. The web service is hosted by the Oracle VDI Web Server.

Chapter 3. Installing Oracle VDI and Configuring Oracle VDI Centers

Table of Contents

3.1. About Oracle VDI Centers and Hosts	19
3.1.1. Single Oracle VDI Host Configuration	20
3.1.2. High Availability Configuration Using Embedded MySQL Server	20
3.1.3. High Availability Configuration Using Remote MySQL Database	21
3.2. Oracle VDI System Requirements	21
3.2.1. Oracle VDI Hardware Requirements	21
3.2.2. Supported Installation Platforms for Oracle VDI	22
3.2.3. Required Packages for Oracle VDI on Linux Platforms	22
3.2.4. Required Packages for Oracle VDI on Solaris Platforms	23
3.2.5. Required packages for Sun Ray Software	23
3.2.6. Time Synchronization	23
3.3. Preparing to Use a Remote MySQL Database	23
3.4. Oracle VDI Centers in Virtualized Environments	24
3.5. How to Install Oracle VDI	24
3.6. How to Configure Oracle VDI on a Primary Host	25
3.7. How to Configure Oracle VDI on a Secondary Host	26
3.8. Updating Oracle VDI to Release 3.3	28
3.8.1. How to Update an Oracle VDI Center (Single Host)	29
3.8.2. How to Update an Oracle VDI Center (High Availability With Bundled MySQL Cluster)	30
3.8.3. How to Update an Oracle VDI Center (High Availability With Remote MySQL Database).....	33
3.9. How to Reconfigure Oracle VDI on a Host	36
3.10. Reinstalling Oracle VDI	36
3.11. How to Uninstall Oracle VDI	36
3.12. Firewall Ports and Protocols	37
3.12.1. Firewalls Between Clients and Oracle VDI	37
3.12.2. Firewalls Between Oracle VDI and User Directories	37
3.12.3. Firewalls Between Oracle VDI and Desktop Providers	38
3.12.4. Firewalls Between the Hosts in an Oracle VDI Center	39

3.1. About Oracle VDI Centers and Hosts

An Oracle VDI Center consists of one or more hosts on which the Oracle VDI software is installed.

After the software is installed on a host, it must be configured. The first host that is configured forms the Oracle VDI Center and this host is known as the **primary host**. Additional hosts are configured and added to the Oracle VDI Center as **secondary hosts**. Having more than one host in an Oracle VDI Center automatically configures the Center for **high availability**. High availability offers reliability so that if one host fails, another one continues to host desktop sessions with only a minimal interruption to the user. An Oracle VDI Center containing a single host is also a supported configuration.

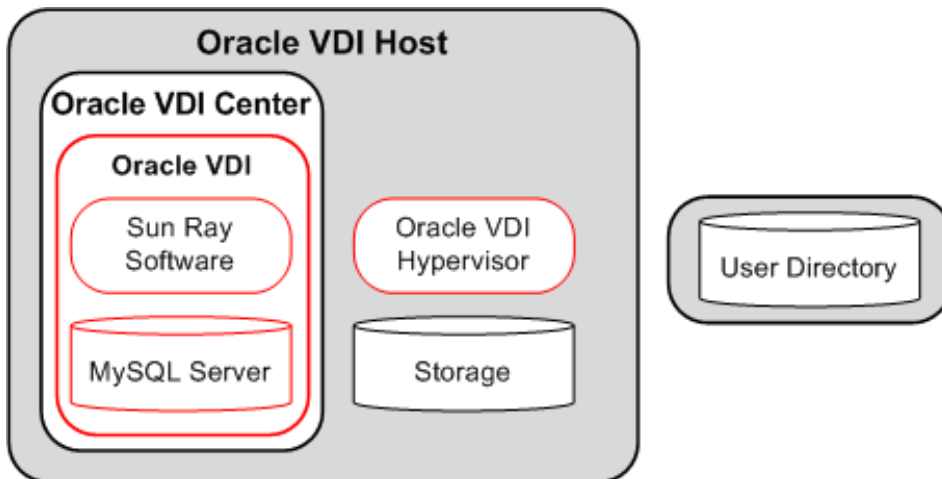
Apart from high availability, the other main configuration choice is whether to use the embedded Oracle VDI MySQL database, or to connect to your own remote database.

There are several possible configurations for Oracle VDI. The following sections describe the main configuration models.

3.1.1. Single Oracle VDI Host Configuration

The single Oracle VDI host configuration is a configuration for deployments that prioritize low cost above high availability. With a single Oracle VDI host there is no failover and all the required components are installed on a single host. This configuration is possible only on Oracle Solaris platforms, and you must use the bundled Oracle VDI Hypervisor.

Figure 3.1. Single Oracle VDI Host Configuration



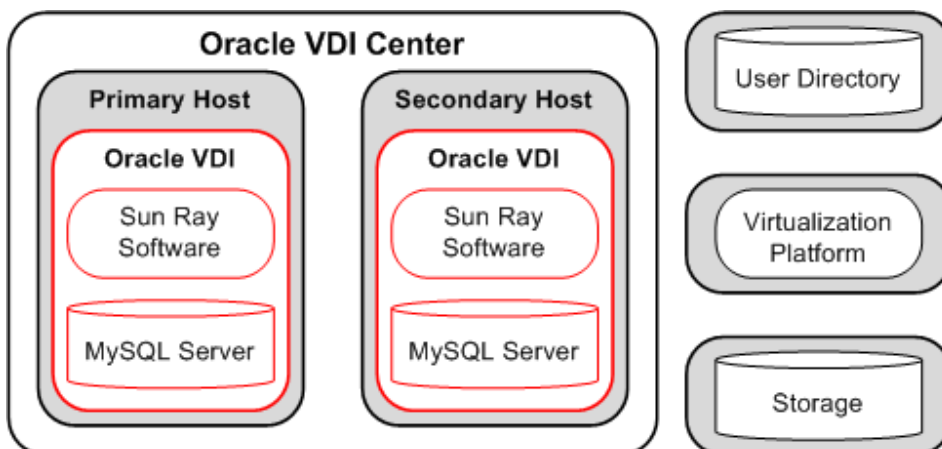
The single Oracle VDI host configuration is different from the single host configuration in previous releases of Oracle VDI because it uses the embedded MySQL Server database. In previous releases, the database was configured as a remote database, even though it was located on the same host as Oracle VDI.

It is possible to use separate hosts for the database, virtualization platform, and storage, but this increases the cost of the deployment without increasing availability.

3.1.2. High Availability Configuration Using Embedded MySQL Server

The high availability configuration using the embedded MySQL Server database requires a minimum of two hosts. The primary host forms the Oracle VDI Center and high availability is automatically configured as soon as a secondary host is added. Additional secondary hosts can be added to the Oracle VDI Center to increase capacity.

Figure 3.2. High Availability Configuration Using Embedded MySQL Server



This configuration provides high availability at both the database level and the desktop access level.

At the database level, the primary host runs the master database for the entire Oracle VDI Center. The first secondary host that is added to the Oracle VDI Center runs the slave database. The slave database is not active, it simply receives asynchronous replications from the master. If the primary host becomes unavailable, the secondary host with the slave database is automatically promoted to become the new primary. Additional secondary hosts have no database role.

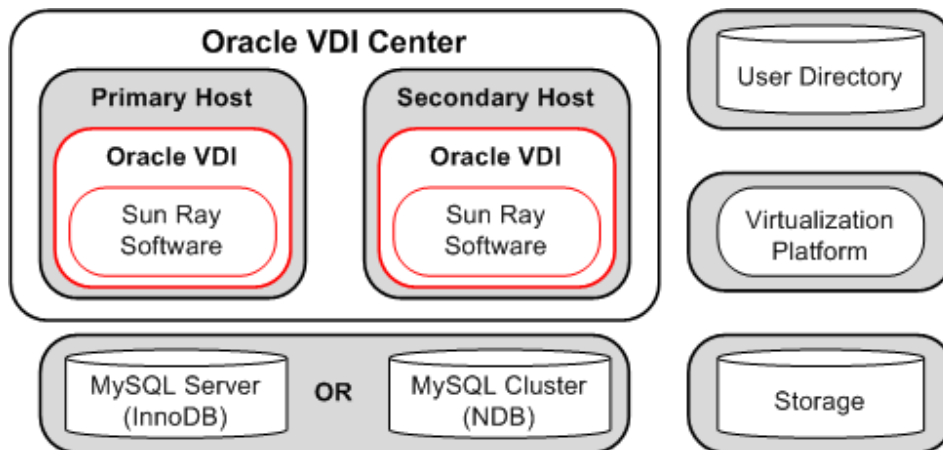
At the desktop access level, the primary host is configured as the Sun Ray primary server and the secondary hosts are configured as Sun Ray secondary servers. Together they form a failover group. If one host fails, another host continues to host desktop sessions with only a minimal interruption to the user. If the primary host becomes unavailable, the secondary host is automatically promoted to become the new primary.

High availability of the virtualization platform, storage and user directory must be configured separately.

3.1.3. High Availability Configuration Using Remote MySQL Database

The high availability configuration using a remote MySQL database requires a minimum of two hosts. The primary host forms the Oracle VDI Center and high availability is automatically configured as soon as a secondary host is added. Additional secondary hosts can be added to the Oracle VDI Center to increase capacity.

Figure 3.3. High Availability Configuration Using Remote MySQL Database



This configuration provides high availability at the desktop access level. The primary host is configured as the Sun Ray primary server and the secondary hosts are configured as Sun Ray secondary servers. Together they form a failover group. If one host fails, another host continues to host desktop sessions with only a minimal interruption to the user. If the primary host becomes unavailable, the secondary host is automatically promoted to become the new primary.

High availability at the database level can be configured for the remote database, but this is configured outside of Oracle VDI.

High availability of the virtualization platform, storage and user directory must be configured separately.

3.2. Oracle VDI System Requirements

3.2.1. Oracle VDI Hardware Requirements

Oracle VDI has very basic hardware requirements. Customers can use new or existing hardware, as long as it meets the following requirements:

- At least one 2.0GHz x86-64 (x64) CPU
- At least 4GB RAM
- At least 32GB disk space

These requirements assume the host is used only for Oracle VDI.

Hardware sizing is a very important part of planning an Oracle VDI deployment. Some basic sizing guidelines can be found at [Chapter 8, Performance and Tuning](#). For more detailed assistance with sizing, contact an Oracle VDI Sales or Support representative.

3.2.2. Supported Installation Platforms for Oracle VDI

The following are the supported installation platforms for Oracle VDI:

Operating System	Supported Releases
Oracle Linux (64-bit) on x86 platforms	5.6
Oracle Solaris (64-bit) on x86 platforms	Solaris 10 release 10/09 (update 8) or later Note: Solaris 11 is not supported.

All the hosts in the same Oracle VDI Center must use the same operating system. The use of mixed operating systems in the same Oracle VDI Center is not supported.

For the best performance on Oracle Linux platforms, use the Oracle Unbreakable Enterprise Kernel.

The supported installation platforms for Oracle VDI can be virtualized, see [Section 3.4, “Oracle VDI Centers in Virtualized Environments”](#).

3.2.3. Required Packages for Oracle VDI on Linux Platforms

On Oracle Linux platforms, Oracle VDI requires specific packages to be installed for Oracle VDI hosts to function correctly. The following are the required packages:

- `iscsi-initiator-utils`
- `nss`
- `ntp`

The Oracle VDI installation script checks for these packages before installing the software. If the packages are not installed, the installation script stops.

To check if a package is installed on the host, run the following command as root:

```
# rpm -q <package-name>
```

To install a required package, run the `up2date` or `yum` command as root, for example:

```
# yum install <package-name>
```

On Oracle Linux platforms, software repositories for installing and updating software packages are not configured by default. For information on how to configure software repositories, see <http://www.oracle.com/technetwork/topics/linux/yum-repository-setup-085606.html>.

If you install the `iscsi-initiator-utils` package from a separately-provided `.rpm` file, do not use the `--noscript` option when you install it, as this prevents some required files from being installed. Install the package by running the following command as root:

```
# rpm -ivh --nosignature iscsi-initiator-utils-<version>.rpm
```

Checking the Status of the iSCSI daemon

The iSCSI daemon must be running on the Oracle VDI host. Use the following command to check:

```
/etc/init.d/iscsi status
```

If the daemon is not running, start it with the following command:

```
/etc/init.d/iscsi start
```

3.2.4. Required Packages for Oracle VDI on Solaris Platforms

On Oracle Solaris platforms, you must install the Entire distribution to get the libraries required by Oracle VDI. If you use Solaris zones, Oracle VDI must be installed in the global zone. Installation in a non-global zone is not supported.

3.2.5. Required packages for Sun Ray Software

In addition to the required packages for Oracle VDI, there are required packages for Sun Ray Software. The Oracle VDI installation script does not check for these packages before installing the software. If the packages are not installed, the Sun Ray Software installation fails. The required packages are listed in *Chapter 2 Product Requirements* of the [Sun Ray Software 5.2 Installation and Configuration Guide](#).

3.2.6. Time Synchronization

It is important to synchronize the time on Oracle VDI hosts. Use Network Time Protocol (NTP) software to ensure the time on all hosts is synchronized.

When you configure Oracle VDI, a check is made as to whether NTP is configured on the host. If NTP is not configured, the first host (the primary) added to the Oracle VDI Center is automatically configured as an NTP server, and the secondary hosts in the Oracle VDI Center automatically synchronize their times with the primary. If NTP is configured but the time on a host is not synchronized, a warning displays when you configure Oracle VDI.

3.3. Preparing to Use a Remote MySQL Database

You specify that you want to use a remote MySQL database when you configure the primary host in an Oracle VDI Center. The remote MySQL database must already be installed and configured.

The following are the supported remote databases:

- MySQL server, at least release 5.0, with the InnoDB storage engine.
- MySQL Cluster, at least release 6.2.15, with the NDB storage engine.

To use the remote database, you must provide the following information when you configure Oracle VDI on a primary host:

- The DNS name of the MySQL host.
- The username and password of a privileged administrator in the MySQL database.
- The port number to use for connections to the database and whether you want to use Socket Secure Layer (SSL) to secure the connections.

The privileged database administrator is used only to create and configure an Oracle VDI database on the remote MySQL database. When the Oracle VDI database is created, a database user is also created.

All access to the remote Oracle VDI database is performed through this user. By default, the name of the remote Oracle VDI database is `vda` and the name of the database user is `vdadb`. When you configure the Oracle VDI primary, you can choose different names, and choose a password to use for the database user.

To use SSL connections to the remote database, you must copy the certificate and key files needed for the SSL connection to the primary host so that they can be specified when you configure Oracle VDI. The certificates and key must be in Privacy Enhanced Mail (PEM) format. Depending on the SSL configuration of the remote database, you might need the following:

- The Certificate Authority (CA) certificate
- The client certificate
- The client certificate private key

For more information about MySQL SSL configuration, refer to the MySQL Server Administration chapter of the [MySQL Reference Manual](#).

3.4. Oracle VDI Centers in Virtualized Environments

Oracle VDI can be installed in a virtualized environment. If you plan to create an Oracle VDI Center by cloning an Oracle VDI host template, note the following.

- **Only clone an unconfigured host.**

A fully configured Oracle VDI host template cannot be cloned. You can install the Oracle VDI software in the template, but you can only configure the host and add it to an Oracle VDI Center after it has been cloned.

- **iSCSI initiator node names must be unique for each host.**

After cloning the template, you might have to reconfigure the iSCSI initiator name on the host, so that it is a unique name. See your system documentation for details on how to configure the iSCSI initiator.

- **High availability requires two separate hosts.**

To provide for high availability, the primary host (with the master database) and the secondary host (with the slave database) must be hosted on separate physical machines.

3.5. How to Install Oracle VDI

Before you begin, check that the host meets the requirements for installing Oracle VDI, as described in [Section 3.2, “Oracle VDI System Requirements”](#).

1. Download the Oracle VDI software archive to a temporary location on the host.
2. Log in as root on the host.
3. Unzip the Oracle VDI software archive and change working directory to the extracted directory.

- On Oracle Solaris hosts:

```
# unzip vda_3.3_solaris_amd64.zip
# cd vda_3.3_solaris_amd64
```

- On Oracle Linux hosts:

```
# unzip vda_3.3_linux.zip
# cd vda_3.3_linux
```

4. Install the software.

```
# ./vda-install
```

The software is installed in `/opt/SUNWvda`.

The Software License Agreement is displayed and you are prompted to accept its terms and conditions.

After accepting the license agreement, the installation begins, and all the Oracle VDI components are installed.

At the end of the installation, you are prompted to configure Oracle VDI.

```
Do you want to configure Oracle VDI 3.3 now? ([y]/n)
```

- To configure Oracle VDI **later**, type `n` and press the Return key.
- To configure Oracle VDI **now**, press the Return key.

For details of how to configure Oracle VDI, see:

- [Section 3.6, “How to Configure Oracle VDI on a Primary Host”](#)
- [Section 3.7, “How to Configure Oracle VDI on a Secondary Host”](#)

3.6. How to Configure Oracle VDI on a Primary Host

You can configure Oracle VDI on a host in the following circumstances:

- As part of the software installation, immediately after installing or updating the Oracle VDI software on a host.
- As a separate step, after installing or updating the Oracle VDI software on a host.
- As a separate step, after unconfiguring Oracle VDI on a host.

To use a remote MySQL database instead of the embedded Oracle VDI MySQL database, ensure you have all the required information as described in [Section 3.3, “Preparing to Use a Remote MySQL Database”](#).

1. (Optional) Start the configuration script.

This step is not necessary if you configure the software at the same time as installing the software.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-config
```

A list of configuration types is displayed.

```
1 New Oracle VDI Center
2 Join Oracle VDI Center
Select (1/2):
```

2. To configure the host as the primary host in an Oracle VDI Center, type `1` and press the Return key.

If you are configuring an Oracle VDI Center that contains **only one host**, type `1`.

A list of configuration settings is displayed.

```
Review the settings for a new Oracle VDI Center:
Name: VDI Center
Administrator Password: *****
DNS name of this host: primary.example.com
Maximum number of sessions on this host: 1000
User ID range start: 160000
Database: Embedded Oracle VDI

Do you want to create the Oracle VDI Center now?
Enter 'c' to customize the settings. ([y]/c):
```

The default is to use the embedded Oracle VDI MySQL database. To use a remote MySQL database, you **must** customize the configuration settings.

- To accept the defaults and create the Oracle VDI Center, press the Return key.
- To change the settings before creating the Oracle VDI Center, type `c` and press the Return key.

If you change the settings, you can review the changes before they are applied.

The host is configured using the supplied settings.

The following are the configuration settings for a primary host:

- **Name:** The name of the Oracle VDI Center. The name can contain alphanumeric characters as well as spaces.
- **Administrator Password:** The password used to secure the embedded Oracle VDI MySQL database and the Sun Ray datastore.

Normally you do not need to know this password and an automatically-generated password is used. To use the automatically-generated password, press the Return key. Otherwise you can provide a password, which you have to enter twice to confirm. The password must contain at least five characters.

- **DNS name of this host:** The fully-qualified DNS name of the host, for example `primary.example.com`. There must be a valid DNS entry for the host, otherwise the configuration fails.
- **Maximum number of sessions on this host:** This is the maximum number of user sessions that can run on *each Oracle VDI host* in the Oracle VDI Center.
- **User ID range start:** Oracle VDI creates a local user for each user session on the Oracle VDI host. This option enables you to specify the starting number of the user ID.
- **Database:** Choose whether to use the embedded Oracle VDI MySQL database, or connect to a remote MySQL database. For more information about using remote databases, see [Section 3.3, "Preparing to Use a Remote MySQL Database"](#).

3.7. How to Configure Oracle VDI on a Secondary Host

You can configure Oracle VDI on a host in the following circumstances:

- As part of the software installation, immediately after installing or updating the Oracle VDI software on a host.

- As a separate step, after installing or updating the Oracle VDI software on a host.
- As a separate step, after unconfiguring Oracle VDI on a host.

1. (Optional) Start the configuration script.

This step is not necessary if you configure the software at the same time as installing the software.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-config
```

A list of configuration types is displayed.

```
1 New Oracle VDI Center
2 Join Oracle VDI Center

Select (1/2):
```

2. To configure the host as a secondary host in an Oracle VDI Center, type **2** and press the Return key.

You are prompted to enter the DNS name of the primary host in the Oracle VDI Center.

```
Enter the primary Oracle VDI Host:
```

3. Enter the fully-qualified DNS name of the primary host in the Oracle VDI Center and press the Return key.

For example, `primary.example.com`.

The MD5 fingerprint of the primary's SSL certificate is displayed and you are prompted to enter the password of the root user on the primary host.

```
Retrieving certificate from primary.example.com...
MD5 fingerprint is 7F:59:0C:92:42:FD:13:34:B5:6A:B2:6A:BA:06:C4:E7.

Enter the root password for primary.example.com:
```

4. Check that the MD5 fingerprint matches the fingerprint of the primary host.

This is an important security step that ensures you are adding the secondary to a genuine Oracle VDI Center. To check the fingerprint:

- a. Log in as root on the primary host.
- b. Use the `vda-center agent-status` command to display the MD5 fingerprint of the primary host.

```
# /opt/SUNWvda/sbin/vda-center agent-status
Agent is up for 0 day(s), 0:6.
MD5 fingerprint is 7F:59:0C:92:42:FD:13:34:B5:6A:B2:6A:BA:06:C4:E7.
```

5. On the secondary host, enter root's password and press the Return key.

You are prompted to enter the DNS name of the secondary host.

```
Enter the DNS name of this host [secondary.example.com]:
```

6. To accept the detected DNS name of the secondary, press the Return key. Otherwise, enter the fully-qualified DNS name of the secondary and press the Return key.

There must be a valid DNS entry for the host, otherwise the configuration fails.

The host is configured using the supplied settings.

3.8. Updating Oracle VDI to Release 3.3

Updates to Oracle VDI release 3.3 are supported only on Oracle Solaris platforms. Updates are supported only from the following releases of Oracle VDI:

- Release 3.2.2
- Release 3.2.1
- Release 3.2

To update from any other release of Oracle VDI, contact Oracle Support.

By default, Oracle VDI release 3.3 uses an embedded MySQL Server database instead of the bundled MySQL Cluster database. The following table summarizes the configuration changes that happen when you update to release 3.3.

Supported Configuration	Configuration Changes
Single Oracle VDI Host	<ul style="list-style-type: none"> • The existing MySQL database is extended to support the new features for release 3.3. • Before the update, the database is treated as a remote database even though it is located on the Oracle VDI host. After the update, the database is still treated as a remote database. • The Single Oracle VDI Host Configuration model is different in release 3.3. You must perform a fresh installation, and not an update, to configure an Oracle VDI Center for this model.
High Availability with bundled MySQL Cluster	<ul style="list-style-type: none"> • On the primary host, the existing data in the MySQL Cluster database is exported and imported in to a new embedded MySQL Server database. This database is the master database. • On the first secondary host, the existing MySQL Cluster database is removed and a new embedded MySQL Server database is created. This database is the slave database that receives asynchronous replications from the master. • On the other secondary hosts, the MySQL Cluster database is removed. MySQL Server is installed on these hosts but it is not used. These hosts have no database role. • Before the update, the primary host might be configured to not host any Oracle VDI sessions. After the update, the primary is configured to host Oracle VDI sessions. • After the update, the configuration model for the Oracle VDI Center is High Availability Configuration Using Embedded MySQL Database.
High Availability with Remote MySQL	<ul style="list-style-type: none"> • The existing MySQL database is extended to support the new features for release 3.3.

Supported Configuration	Configuration Changes
	<ul style="list-style-type: none"> Before the update, the primary host might be configured to not host any Oracle VDI sessions. After the update, the primary is configured to host Oracle VDI sessions. After the update, the configuration model for the Oracle VDI Center is High Availability Configuration Using Remote MySQL Database.

To update Oracle VDI, follow the instructions for your specific Oracle VDI configuration:

- [Section 3.8.1, “How to Update an Oracle VDI Center \(Single Host\)”](#)
- [Section 3.8.2, “How to Update an Oracle VDI Center \(High Availability With Bundled MySQL Cluster\)”](#)
- [Section 3.8.3, “How to Update an Oracle VDI Center \(High Availability With Remote MySQL Database\)”](#)

In addition to updating Oracle VDI, you might also have to update your virtualization platform.

3.8.1. How to Update an Oracle VDI Center (Single Host)

Before you begin:

- Ensure that no users are logged in to Oracle VDI on the host. The update stops all Oracle VDI services.
 - Ensure that you have the user name and password of the privileged administrator of the remote database.
 - Check that the host meets the requirements for installing Oracle VDI, see [Section 3.2, “Oracle VDI System Requirements”](#).
 - Check that the host meets the requirements for updating Oracle VDI, see [Section 3.8, “Updating Oracle VDI to Release 3.3”](#).
1. Download the Oracle VDI software archive to a temporary location on the host.
 2. Log in as root on the host.
 3. Make a backup of the Oracle VDI database.

While the backup job is running, all other jobs are stopped or held in the queue.

- From the CLI, run the `vda-backup` command.

```
# /opt/SUNWvda/sbin/vda-backup -p <path-to-directory> -o <output-file-name>
```

Use the `vda-backup -h` to see all the options for this command.

- In Oracle VDI Manager:
 - a. Go to **Settings** → **VDI Center**.
 - b. Select the **Database** tab.
 - c. In the **VDI Database Backup** section, click **Backup**.
- 4. Unzip the Oracle VDI software archive and change working directory to the extracted directory.

```
# unzip vda_3.3_solaris_amd64.zip
# cd vda_3.3_solaris_amd64
```

5. Preserve the Oracle VDI configuration on the host.

```
# ./vda-preserve
```

This step preserves the Oracle VDI configuration settings and stops Oracle VDI services on the host.

6. Install the software.

```
# ./vda-install
```

An existing installation is detected and you are prompted to update the installation.

```
Oracle Virtual Desktop Infrastructure 3.3 Installation
```

```
Oracle VDI 3.2.2 is already installed on this host.  
Do you want to update to Oracle VDI 3.3 now? ([y]/n)
```

7. To update, press the Return key.

The Software License Agreement is displayed and you are prompted to accept its terms and conditions.

After accepting the license agreement, the update begins and you are prompted for the administrator password for the remote database.

```
Oracle VDI 3.3 Installation
```

```
Updating from Oracle VDI 3.2.2 to Oracle VDI 3.3
```

```
MySQL VDA Database Update.
```

```
Enter remote database administrator privileged user name: mydbadmin
```

```
Enter remote database administrator privileged password:
```

8. Type the administrator password and press the Return key.

The Oracle VDI components are updated.

At the end of the update, you are prompted to configure Oracle VDI.

```
Do you want to configure Oracle VDI 3.3 now? ([y]/n)
```

9. To configure the host, press the Return key.

The host is configured using the details from the preserved configuration.

To configure the host later, type `n` and press the Return key. Use the `vda-config` command to configure.

3.8.2. How to Update an Oracle VDI Center (High Availability With Bundled MySQL Cluster)

Before you begin:

- Ensure that no users are logged in to the Oracle VDI Center. The update stops all Oracle VDI services in the Center.
- Check that the hosts meet the requirements for installing Oracle VDI, see [Section 3.2, “Oracle VDI System Requirements”](#).
- Check that the hosts meet the requirements for updating Oracle VDI, see [Section 3.8, “Updating Oracle VDI to Release 3.3”](#).

1. Make a backup of the Oracle VDI database.

The backup can be made on any host in the Oracle VDI Center.

While the backup job is running, all other jobs in the Oracle VDI Center are stopped or held in the queue.

- From the CLI, run the `vda-backup` command.

```
# /opt/SUNWvda/sbin/vda-backup -p <path-to-directory> -o <output-file-name>
```

Use the `vda-backup -h` to see all the options for this command.

- In Oracle VDI Manager:
 - a. Go to **Settings** → **VDI Center**.
 - b. Select the **Database** tab.
 - c. In the **VDI Database Backup** section, click **Backup**.

2. Preserve the Oracle VDI configuration on all hosts in the Oracle VDI Center.

Start with the primary, then the first secondary, followed by the second secondary, and finally the additional secondaries.

Repeat the following steps on each Oracle VDI host.

- a. Download the Oracle VDI software archive to a temporary location on the host.
- b. Log in as root on the host.
- c. Unzip the Oracle VDI software archive and change working directory to the extracted directory.

```
# unzip vda_3.3_solaris_amd64.zip
# cd vda_3.3_solaris_amd64
```

- d. Run the preservation script.

```
# ./vda-preserve
```

This step preserves the Oracle VDI configuration settings and stops Oracle VDI services on the host.

3. Install and configure the software on the **primary host**.

- a. Install the software.

```
# ./vda-install
```

An existing installation is detected and you are prompted to update the installation.

```
Oracle Virtual Desktop Infrastructure 3.3 Installation

Oracle VDI 3.2.2 is already installed on this host.
Do you want to update to Oracle VDI 3.3 now? ([y]/n)
```

- b. To update, press the Return key.

The Software License Agreement is displayed and you are prompted to accept its terms and conditions.

After accepting the license agreement, the update begins.

At the end of the update, you are prompted to configure Oracle VDI.

```
Do you want to configure Oracle VDI 3.3 now? ([y]/n)
```

- c. To configure the host, press the Return key.

The primary host is configured using the details from the preserved configuration.

To configure the primary host later, type `n` and press the Return key. Use the `vda-config` command to configure. If you do this, you must configure the primary **before** you configure any secondary hosts.

4. Install and configure the software on all the **secondary hosts**.

Start with the first secondary, then the second secondary, followed by the additional secondaries.

Only configure one secondary host at a time. Wait for the configuration to complete before adding additional secondary hosts.

Repeat the following steps on each Oracle VDI host.

- a. Install the software.

```
# ./vda-install
```

An existing installation is detected and you are prompted to update the installation.

```
Oracle Virtual Desktop Infrastructure 3.3 Installation
```

```
Oracle VDI 3.2.2 is already installed on this host.  
Do you want to update to Oracle VDI 3.3 now? ([y]/n)
```

- b. To update, press the Return key.

The Software License Agreement is displayed and you are prompted to accept its terms and conditions.

After accepting the license agreement, the update begins.

At the end of the update, you are prompted to configure Oracle VDI.

```
Do you want to configure Oracle VDI 3.3 now? ([y]/n)
```

- c. To configure the secondary host, press the Return key.

You are prompted to enter the DNS name of the primary host in the Oracle VDI Center.

```
Oracle Virtual Desktop Infrastructure 3.3 Configuration
```

```
Enter the primary Oracle VDI Host [primary.example.com]:
```

To configure the secondary host later, type `n` and press the Return key. Use the `vda-config` command to configure. If you do this, you must configure the primary **before** you configure any secondary hosts.

- d. To accept the original primary host, press the Return key.

The MD5 fingerprint of the primary's SSL certificate is displayed and you are prompted to enter the password of the root user on the primary host.

```
Retrieving certificate from primary.example.com...
MD5 fingerprint is 7F:59:0C:92:42:FD:13:34:B5:6A:B2:6A:BA:06:C4:E7.

Enter the root password for primary.example.com:
```

- e. Check that the MD5 fingerprint matches the fingerprint of the primary host.

This is an important security step that ensures you are adding the secondary to a genuine Oracle VDI Center. To check the fingerprint:

- i. Log in as root on the primary host.
- ii. Use the `vda-center agent-status` command to display the MD5 fingerprint of the primary host.

```
# /opt/SUNWvda/sbin/vda-center agent-status
Agent is up for 0 day(s), 0:6.
MD5 fingerprint is 7F:59:0C:92:42:FD:13:34:B5:6A:B2:6A:BA:06:C4:E7.
```

- f. On the secondary host, enter root's password and press the Return key.

The host is configured using the supplied settings.

3.8.3. How to Update an Oracle VDI Center (High Availability With Remote MySQL Database)

Before you begin:

- Ensure that no users are logged in to the Oracle VDI Center. The update stops all Oracle VDI services in the Center.
- Ensure that you have the user name and password of the privileged administrator of the remote database.
- Check that the hosts meet the requirements for installing Oracle VDI, see [Section 3.2, “Oracle VDI System Requirements”](#).
- Check that the hosts meet the requirements for updating Oracle VDI, see [Section 3.8, “Updating Oracle VDI to Release 3.3”](#).

1. Make a backup of the Oracle VDI database.

While the backup job is running, all other jobs in the Oracle VDI Center are stopped or held in the queue.

- From the CLI, run the `vda-backup` command.

```
# /opt/SUNWvda/sbin/vda-backup -p <path-to-directory> -o <output-file-name>
```

Use the `vda-backup -h` to see all the options for this command.

- In Oracle VDI Manager:
 - a. Go to **Settings** → **VDI Center**.

- b. Select the **Database** tab.
 - c. In the **VDI Database Backup** section, click **Backup**.
2. Preserve the Oracle VDI configuration on all hosts in the Oracle VDI Center.

Start with the primary, then the first secondary, followed by the additional secondaries.

Repeat the following steps on each Oracle VDI host.

- a. Download the Oracle VDI software archive to a temporary location on the host.
- b. Log in as root on the host.
- c. Unzip the Oracle VDI software archive and change working directory to the extracted directory.

```
# unzip vda_3.3_solaris_amd64.zip
# cd vda_3.3_solaris_amd64
```

- d. Run the preservation script.

```
# ./vda-preserve
```

This step preserves the Oracle VDI configuration settings and stops Oracle VDI services on the host.

3. Install and configure the software on the **primary host**.

- a. Install the software.

```
# ./vda-install
```

An existing installation is detected and you are prompted to update the installation.

```
Oracle Virtual Desktop Infrastructure 3.3 Installation

Oracle VDI 3.2.2 is already installed on this host.
Do you want to update to Oracle VDI 3.3 now? ([y]/n)
```

- b. To update, press the Return key.

The Software License Agreement is displayed and you are prompted to accept its terms and conditions.

After accepting the license agreement, the update begins and you are prompted for the administrator password for the remote database.

```
Oracle VDI 3.3 Installation
Updating from Oracle VDI 3.2.2 to Oracle VDI 3.3

MySQL VDA Database Update.
Enter remote database administrator privileged user name: mydbadmin
Enter remote database administrator privileged password:
```

- c. Enter the administrator password and press the Return key.

The Oracle VDI components are updated.

At the end of the update, you are prompted to configure Oracle VDI.

```
Do you want to configure Oracle VDI 3.3 now? ([y]/n)
```

- d. To configure the host, press the Return key.

The primary host is configured using the details from the preserved configuration.

To configure the primary host later, type `n` and press the Return key. Use the `vda-config` command to configure. If you do this, you must configure the primary **before** you configure any secondary hosts.

4. Install and configure the software on all the **secondary hosts**.

Start with the first secondary, followed by the additional secondaries.

Only configure one secondary host at a time. Wait for the configuration to complete before configuring additional secondary hosts.

Repeat the following steps on each Oracle VDI host.

- a. Install the software.

```
# ./vda-install
```

An existing installation is detected and you are prompted to update the installation.

```
Oracle Virtual Desktop Infrastructure 3.3 Installation
```

```
Oracle VDI 3.2.2 is already installed on this host.  
Do you want to update to Oracle VDI 3.3 now? ([y]/n)
```

- b. To update, press the Return key.

The Software License Agreement is displayed and you are prompted to accept its terms and conditions.

After accepting the license agreement, the update begins.

At the end of the update, you are prompted to configure Oracle VDI.

```
Do you want to configure Oracle VDI 3.3 now? ([y]/n)
```

- c. To configure the secondary host, press the Return key.

You are prompted to enter the DNS name of the primary host in the Oracle VDI Center.

```
Oracle Virtual Desktop Infrastructure 3.3 Configuration
```

```
Enter the primary Oracle VDI Host [primary.example.com]:
```

To configure the secondary host later, type `n` and press the Return key. Use the `vda-config` command to configure. If you do this, you must configure the primary **before** you configure any secondary hosts.

- d. To accept the original primary host, press the Return key.

The MD5 fingerprint of the primary's SSL certificate is displayed and you are prompted to enter the password of the root user on the primary host.

```
Retrieving certificate from primary.example.com...
```

```
MD5 fingerprint is 7F:59:0C:92:42:FD:13:34:B5:6A:B2:6A:BA:06:C4:E7.
```

```
Enter the root password for primary.example.com:
```

- e. Check that the MD5 fingerprint matches the fingerprint of the primary host.

This is an important security step that ensures you are adding the secondary to a genuine Oracle VDI Center. To check the fingerprint:

- i. Log in as root on the primary host.
- ii. Use the `vda-center agent-status` command to display the MD5 fingerprint of the primary host.

```
# /opt/SUNWvda/sbin/vda-center agent-status
Agent is up for 0 day(s), 0:6.
MD5 fingerprint is 7F:59:0C:92:42:FD:13:34:B5:6A:B2:6A:BA:06:C4:E7.
```

- f. On the secondary host, enter root's password and press the Return key.

The host is configured using the supplied settings.

3.9. How to Reconfigure Oracle VDI on a Host

You might want to reconfigure an Oracle VDI Host to remove it from an Oracle VDI Center or if there is a problem with the host's configuration.

1. Unconfigure Oracle VDI.

```
# /opt/SUNWvda/sbin/vda-config -u
```

2. Reconfigure Oracle VDI.

See [Section 3.6, "How to Configure Oracle VDI on a Primary Host"](#).

See [Section 3.7, "How to Configure Oracle VDI on a Secondary Host"](#).

3.10. Reinstalling Oracle VDI

If you want to reinstall Oracle VDI on a host **and** preserve your configuration, you must first back up the following:

- **Database:** You must backup the database before reinstalling. This enables you to restore the current system. For more information about backing up the Oracle VDI database, refer to [Section 9.4, "Backing Up and Restoring the Oracle VDI Database"](#).
- **Customized `{*}my.conf{*}` files:** The database configuration file. The reinstall creates a new `/etc/opt/SUNWvda/my.cnf` file. Add the customizations from the backup to the new file.
- **Customized `{*}pam.conf{*}` files:** The Sun Ray Server Software access configuration file. The reinstall creates a new `/etc/pam.conf` file. Add the customizations from the backup to the new file.

To reinstall Oracle VDI, you must first uninstall it, see [Section 3.11, "How to Uninstall Oracle VDI"](#). After reinstalling the software, restore the data from the backups.

3.11. How to Uninstall Oracle VDI

- Unconfigure and uninstall the Oracle VDI.


```
# /opt/SUNWvda/sbin/vda-install -u
```

3.12. Firewall Ports and Protocols

Firewalls can be used to protect various parts of a network and must be configured to permit the connections required by Oracle VDI.

3.12.1. Firewalls Between Clients and Oracle VDI

Clients must be able to connect to any host in an Oracle VDI Center.

The following table lists the ports you might need to open to permit these connections.

Source	Destination	Port	Protocol	Purpose
Client	Oracle VDI web server	1800	TCP	HTTP connections to Oracle VDI Manager. These connections are redirected to port 1801.
Client	Oracle VDI web server	1801	TCP	HTTPS connections to Oracle VDI Manager.
Client	Oracle VDI web server	1802	TCP	HTTPS connections to the VDI Client web services API.
Client	Oracle VDI host	3389	TCP	RDP connections to the Oracle VDI RDP Broker.
Sun Ray Clients	Oracle VDI host	Various	Various	See Chapter 2 of the Sun Ray Software 5.2 Installation and Configuration Guide for details.

3.12.2. Firewalls Between Oracle VDI and User Directories

All hosts in an Oracle VDI Center need to be able to make connections to any of the configured user directories.

The following table lists the ports you might need to open to permit these connections.

Source	Destination	Port	Protocol	Purpose
Oracle VDI host	Windows server	53	UDP	DNS lookups on Active Directory.
Oracle VDI host	Windows server	88	TCP or UDP	Authenticate users in Active Directory.
Oracle VDI host	LDAP directory	389	TCP	Authenticate users in an LDAP directory.
Oracle VDI host	Windows server	464	TCP or UDP	Enable users to change their password if it has expired.
Oracle VDI host	LDAP directory server	636	TCP	Authenticate users using a secure connection to an LDAP directory.

Source	Destination	Port	Protocol	Purpose
Oracle VDI host	Windows server	3268	TCP	Authenticate users in Active Directory.

Ports Required for Active Directory Type Directories

Each Oracle VDI host must be able to make connections to Active Directory on the following ports:

- Port 53 for DNS lookups on Active Directory
- Ports 88 and 464 for Kerberos authentication to a Key Distribution Center (KDC)
- Port 389 for the secure LDAP connection to a domain controller
- Port 3268 for the secure LDAP connection to a global catalog server

Oracle VDI performs several DNS lookups to discover LDAP information. For these lookups to work, it is essential that your DNS is configured correctly to enable the required information to be returned from Active Directory.

Ports 88 and 464 are the standard ports used for Kerberos authentication to a Key Distribution Center (KDC). These ports are configurable. Connections to these ports can use either the TCP or UDP protocol depending on the packet size and your Kerberos configuration. Port 464 is only required for password change operations.

Ports Required for LDAP Type Directories

The standard ports used for connections to LDAP directories are port 389 for standard connections (simple authentication) and port 636 for secure connections (secure authentication). These ports are configurable.

3.12.3. Firewalls Between Oracle VDI and Desktop Providers

In order to run desktops, all hosts in an Oracle VDI Center must be able to connect to any of the configured desktop provider hosts, and their associated storage hosts.

The ports used for connections depends on the desktop provider type and whether the storage is managed by Oracle VDI.

The following table lists the ports you might need to open to permit these connections.

Source	Destination	Port	Protocol	Purpose
Oracle VDI host	Storage host	22	TCP	Storage management using SSH. Required only for Oracle VDI and Hyper-V desktop providers.
Oracle VDI host	Oracle VM VirtualBox host	22	TCP	Used to run some Oracle VM VirtualBox commands over SSH. Required only for the Oracle VDI desktop provider.
Oracle VDI host	Desktop provider host	443	TCP	HTTPS connections to web services for provisioning and managing virtual desktops, or HTTPS connections for Windows Remote Management (WinRM).

Source	Destination	Port	Protocol	Purpose
				Required only for Oracle VDI, Microsoft Hyper-V, VMware vCenter, and Microsoft Remote Desktop desktop providers.
Oracle VDI host	Storage host	3260	TCP	iSCSI connections when virtual disks are copied for management reasons, for example when desktops are imported or copied to a storage host for cloning. Required only for Oracle VDI and Hyper-V desktop providers.
Oracle VM VirtualBox host or Microsoft Hyper-V host	Storage host	3260	TCP	iSCSI connections to connect virtual machines to their virtual disks. Required only for Oracle VDI and Hyper-V desktop providers.
Oracle VDI host	Desktop provider host	3389	TCP	Microsoft RDP connections to virtual desktops.
Oracle VDI host	Oracle VM VirtualBox host	49152-65534	TCP	Oracle VM VirtualBox RDP (VRDP) connections to virtual desktops. Required only for the Oracle VDI desktop provider if VRDP is selected as the desktop protocol.

Ports 22, 443, 3389, and 49152-65534 are configurable.

On Oracle VM VirtualBox hosts, port 18083 is also used for HTTP connections to the Oracle VM VirtualBox web service. This port is bound to localhost.

3.12.4. Firewalls Between the Hosts in an Oracle VDI Center

A network might contain firewalls between the hosts in an Oracle VDI Center, for example if you have multiple offices each containing an Oracle VDI host. The Oracle VDI hosts must be able to connect to any other member of the Oracle VDI Center.

The following table lists the ports you might need to open to permit these connections.

Source	Destination	Port	Protocol	Purpose
Oracle VDI host	Another Oracle VDI host	3307	TCP	Connections to the Oracle VDI embedded MySQL Server database.
Oracle VDI host	Remote MySQL database host	Configurable	Configurable	Connection to a remote MySQL database. Required only if a remote MySQL database is selected when you configure an Oracle VDI Center.
Oracle VDI host	Another Oracle VDI host	11172	TCP	Used for the JMX-MP connector to Cacao. Used by the <code>cacaoadm</code> command

Source	Destination	Port	Protocol	Purpose
Oracle VDI host	Another Oracle VDI host	11173	TCP	Used for the command stream connector to Cacao. Used by <code>vda</code> and <code>vda-center</code> commands.
Oracle VDI host	Another Oracle VDI host	11174	TCP	Used for the JMX RMI connector to Cacao. Used by the Oracle VDI Manager and for the communication between Oracle VDI Center Agents.
Sun Ray Software	Sun Ray Software	Various	Various	See Chapter 2 of the Sun Ray Software 5.2 Installation and Configuration Guide for details.

On Oracle VDI hosts, port 3303 is also used for the connection between the `vda client` command and the Oracle VDI host. This port is bound to localhost and is configurable.

Chapter 4. Configuring Companies and User Directories

Table of Contents

4.1. About User Directory Integration	41
4.1.1. Active Directory Types	41
4.1.2. LDAP Types	42
4.1.3. User Directory Customization	43
4.2. Supported User Directories	43
4.3. About Companies	44
4.3.1. Changes to Desktop Selector	44
4.3.2. Corporation Setting	44
4.4. How to Create a Company	45
4.5. How to Set Up Kerberos Authentication	45
4.5.1. Whitelist and Blacklist Support	48
4.6. How to Set Up Public Key Authentication	48
4.7. How to Set Up Anonymous Authentication	50
4.8. How to Set Up Simple Authentication	50
4.9. How to Set Up Secure Authentication	51
4.10. About Complex Forest Configurations	52
4.11. How to Reconfigure the User Directory Settings	53
4.11.1. Defining the User Directory	53
4.11.2. Changing the Security Level	53
4.11.3. Changing the Credentials	54
4.11.4. Updating the Server SSL Certificates	54
4.11.5. Adding Fallback Hosts	54
4.12. About Global Oracle VDI Centers	54
4.12.1. Oracle VDI Center - Home and Foreign	55
4.12.2. Guest Pools	55
4.12.3. Oracle VDI Login and Desktop Selector Dialog	55
4.13. How to Prepare a User Directory for Global Oracle VDI Centers	56
4.13.1. Oracle VDI Center Data Schema	56
4.14. About LDAP Filters and Attributes	57
4.14.1. Searching for Users and Groups	58
4.14.2. Requesting a Desktop for a User	58
4.14.3. Resolving Group Membership	58
4.14.4. LDAP Cache	59
4.15. Removing a Company	59

4.1. About User Directory Integration

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

4.1.1. 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 hosts. To set up Active Directory integration quickly, for example for testing purposes, you can use LDAP Types, see [Section 4.1.2, “LDAP Types”](#).

See [Section 4.2, “Supported User Directories”](#) for details of the supported versions of Active Directory.

The users from the Active Directory can be used for desktop and pool assignments and will be able to access desktops provided by Oracle VDI. On top of this basic feature, Active Directory integration offers the following functionalities:

1. Active Directory integration enables access to 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 VDI.

For more details on supported forest configurations, see [Section 4.10, “About Complex Forest Configurations”](#).

2. Active Directory integration allows computer entries to be removed from the Active Directory when cloned desktops are deleted by the Oracle VDI.

When a Windows desktop (cloned in the Oracle VDI) joins a domain through Sysprep, this will typically create a new computer entry in the Active Directory. Configuring the Oracle VDI with Kerberos Authentication will allow the Oracle VDI 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 ([Section 7.2.6, “How to Change User 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 section [Section 4.5, “How to Set Up Kerberos Authentication”](#) for more information.

- **Public Key Authentication** - To be used to integrate with Microsoft Active Directory when the domain controller requires LDAP signing, see: <http://support.microsoft.com/kb/935834>.

See section [Section 4.6, “How to Set Up Public Key Authentication”](#) for more information.

4.1.2. LDAP Types

LDAP integration is the recommended choice for integrating with other types of LDAP directories or to set up Active Directory integration quickly. The setup is straight-forward, without the need for extra configuration.

See [Section 4.2, “Supported User Directories”](#) for details of the supported LDAP directories.

LDAP integration allows users to update their password ([Section 7.2.6, “How to Change User 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 VDI.

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

- **Anonymous Authentication** - Useful for a quick integration with an LDAP server but not recommended for production environments. Anonymous Authentication may only be chosen if the LDAP server supports anonymous authentication. Active Directory does not support Anonymous Authentication.

See section [Section 4.7, “How to Set Up Anonymous Authentication”](#) for more information.

- **Simple Authentication** - The recommended choice for production platforms integrating with LDAP directories other than Active Directory. If integrating with Active Directory, use Kerberos Authentication, see [Section 4.5, “How to Set Up Kerberos Authentication”](#). A default restriction in Active Directory prevents password updates from an LDAP Simple Authentication.

See section [Section 4.8, “How to Set Up Simple Authentication”](#) for more information.

- **Secure Authentication** - Useful to secure connections over SSL, when the directory supports it.

See section [Section 4.9, “How to Set Up Secure Authentication”](#) for more information.

When a user gets a desktop from Oracle VDI (via the desktop selector), Oracle VDI 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 VDI enables users to authenticate is through their email address, however, an email address is not a valid user name on the desktop side.

Before Oracle VDI 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, Oracle VDI cannot detect the default domain, so you need to set the `directory.default.domain` property using the `vda directory-setprops` command. If you don't set this property, users will have to authenticate again on the desktop side.

4.1.3. User Directory Customization

If you have an expert understanding of user directory integration and would like to optimize Oracle VDI for your user directory, refer to the following sections:

- [Appendix C, User Directory LDAP Filters and Attributes](#)
- [Section C.1, “How to Edit LDAP Filters and Attributes”](#)
- [Section 4.11, “How to Reconfigure the User Directory Settings”](#)

4.2. Supported User Directories

The following versions of Active Directory are supported as Active Directory type user directories:

- Windows Server 2008 R2
- Windows Server 2008
- Windows Server 2003 R2
- Windows Server 2003

The following directories are supported as LDAP type user directories:

- Oracle Directory Server Enterprise Edition 7.0
- Oracle Directory Server Enterprise Edition 6.3.1
- Microsoft Active Directory on Windows Server 2008 R2
- Microsoft Active Directory on Windows Server 2008
- Microsoft Active Directory on Windows Server 2003 R2

- Microsoft Active Directory on Windows Server 2003
- Novell eDirectory 8.8
- OpenLDAP 2.4.19

4.3. About Companies

The Company feature enables several user directories to be configured for one Oracle VDI 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 , refer to section [Section 4.4, "How to Create a Company"](#). For more information about user directory integration, refer to section [Section 4.1, "About User Directory Integration"](#).

4.3.1. 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 user name that identifies which company they belong to. The user can enter one of the following user names 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.)



Note

When a user gets a desktop from Oracle VDI (via the desktop selector), Oracle VDI 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 VDI enables users to authenticate is through their email address, however, an email address is not a valid user name on the desktop side.

Before Oracle VDI 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, Oracle VDI cannot detect the default domain, so you need to set the `directory.default.domain` property using the `vda directory-setprops` command. If you don't set this property, users will have to authenticate again on the desktop side.

4.3.2. 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 .

4.4. How to Create a Company

Most production environments keep user information stored in an Active Directory or LDAP server. Oracle VDI can be configured to recognize existing user directories in the . Multiple user directories can be configured for one Oracle VDI instance with the Company feature. For more information about the Company feature, refer to section [Section 4.3, "About Companies"](#).

Oracle VDI Manager Steps

1. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. In the **Companies** table, click **New** to activate the **New Company** wizard.
3. 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 Oracle VDI hosts is required before setting up Kerberos or Public Key certificates on Oracle VDI.
 - 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.

4.5. 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 Active Directory. This user is 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 hosts 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 hosts and Active Directory server.

Use Network Time Protocol (NTP) software or the `rdate` command to ensure the clocks on all hosts are synchronized.

For example, use `ntpdate my.windows.host`

In a production environment, it is best to an NTP time server.

5. Edit the system default Kerberos configuration file on the Oracle VDI hosts.

The system default Kerberos configuration file is:

- `/etc/krb5/krb5.conf` on Oracle Solaris OS platforms.
- `/etc/krb5.conf` on Oracle Linux platforms.



Caution

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 ([Section 7.2.6, “How to Change User 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 VDA Service.

```
# /opt/SUNWvda/sbin/vda-service restart
```

8. Configure the user directory in Oracle VDI Manager.

- a. In the Oracle VDI Manager, go to **Settings** → **Company**.
- b. In the Companies table, click **New** to activate the **New Company** wizard.
- c. Select **Active Directory Type**, and click **Next**.
- d. Select **Kerberos Authentication**.
- e. Enter the domain for the Active Directory.

For example, `my.company.com`.

- f. 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`.

- g. Enter the password for that user.
- h. Click **Next** to review your choices before completing the configuration.

More Information on Kerberos Authentication

For more information about Kerberos authentication:

- `krb5.conf(4)` man page - <http://download.oracle.com/docs/cd/E19253-01/816-5174/6mbb98ufn/index.html>
- Kerberos Service on Oracle Solaris - <http://download.oracle.com/docs/cd/E19253-01/816-4557/seamtm-1/index.html>

- Kerberos on Oracle Linux - http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/5/html/Deployment_Guide/ch-kerberos.html

4.5.1. Whitelist and Blacklist Support

Oracle VDI supports the Whitelist and 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 Oracle VDI.

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 Oracle VDI 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.

4.6. How to Set Up Public Key Authentication

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

Steps

1. Follow the configuration steps 1 to 5 described for Kerberos Authentication. See [Section 4.5, “How to Set Up Kerberos Authentication”](#).
2. Create a client certificate for each of the Oracle VDI 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 host, log in as superuser (root) and use the Java `keytool` utility to generate the key pair in the Oracle VDI keystore.

```
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 host, use `keytool` to generate the certificate request.

```
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.
 - i. Copy the CSR file to the server hosting the Active Directory.

- ii. Using Internet Explorer, go to "<http://localhost/certsrv>".
 - iii. Log in.
 - iv. On the Microsoft Certificate Services page, click **Request a Certificate**.
 - v. On the **Request a Certificate** page, click **Advanced Certificate Request**.
 - vi. 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.
 - vii. 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.
 - viii. Select an appropriate template from the **Certificate Templates** list. (Administrator is recommended).
 - ix. Click **Submit**.
 - x. On the **Certificate Issued** page, ensure **Base 64 Encoded** is selected and click **Download Certificate Chain**.
 - xi. Save the certificate file.
- d. Import the certificate on the Oracle VDI host.
- i. Copy the certificate file to the Oracle VDI host.
 - ii. Import the certificate into the Oracle VDI keystore.

```
keytool -import \  
-keystore /etc/opt/SUNWvda/sslkeystore \  
-storepass changeit -keypass changeit \  
-trustcacerts -file certificate_file \  
-alias your_alias
```

3. Restart the VDA Service.

```
# /opt/SUNWvda/sbin/vda-service restart
```

4. Configure the user directory in Oracle VDI Manager.

- a. In the Oracle VDI Manager, go to **Settings** → **Company**.
- b. In the Companies table, click **New** to activate the **New Company** wizard.
- c. Select **Active Directory Type**, and click **Next**.
- d. Select **Public Key Authentication**.
- e. Enter the domain for the Active Directory.

For example, [my.company.com](#).

- f. The following step shows the SSL certificates of the Active Directory servers. Click **Next** to permanently accept the certificates.

- g. Click **Next** to review your choices before completing the configuration.

4.7. How to Set Up Anonymous Authentication

Use the steps below to set up anonymous authentication.

Oracle VDI Manager Steps

1. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. In the Companies table, click **New** to activate the **New Company** wizard.
3. Select **LDAP Type**, and click **Next**.
4. Select **Anonymous Authentication**.
5. Enter the hostname or IP address, and port number, of the LDAP server.

The default port number, 389, is used by most LDAP servers.

6. 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`.

7. Click **Next** to review your choices before completing the configuration.
8. (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 directory-setprops [-u CompanyName] \  
-p directory.default.domain=domainname
```

4.8. How to Set Up Simple Authentication

Use the steps below to set up simple authentication.



Note

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. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. In the Companies table, click **New** to launch the **New Company** wizard.
3. Select **LDAP Type**, and click **Next**.
4. Select **Simple Authentication**.
5. Enter the hostname or IP address, and port number, of the LDAP server.

The default port number, 389, is used by most LDAP servers.

6. 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`.

7. 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`.
8. Enter the password for the user.
9. Click **Next** to review your choices before completing the configuration.
10. (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 directory-setprops [-u CompanyName] \  
-p directory.default.domain=domainname
```

4.9. How to Set Up Secure Authentication

Use the steps below to set up secure authentication.



Note

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. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. In the Companies table, click **New** to activate the **New Company** wizard.
3. Select **LDAP Type**, and click **Next**.
4. Select **Secure Authentication**.

5. 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.

6. 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`.

7. 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`.

8. Enter the password for the user.
9. The following step shows the SSL certificate of the LDAP server.

Click **Next** to permanently accept the certificate.

10. Review your choices before completing the configuration.

11. (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 directory-setprops [-u CompanyName] \  
-p directory.default.domain=domainname
```

4.10. About Complex Forest Configurations

The following types of Active Directory forest configurations are supported by Oracle VDI.

- Single domain forests
- Single tree forests with multiple domains
- Multiple tree forests with multiple domains with or without child domains

Example of a Single Tree Forest

The Active Directory is a forest containing:

- A root domain named `example.com`. The Global Catalogs are located in the root domain.
- A child domain named `users.example.com` where all the users are located, including the user used to set up authentication in the Oracle VDI Manager.

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

```
[libdefaults]  
default_realm = USERS.EXAMPLE.COM  
  
[realms]  
USERS.EXAMPLE.COM = {  
  kdc = users.host  
  admin_server = users.host  
  kpasswd_protocol = SET_CHANGE  
}  
EXAMPLE.COM = {  
  kdc = example.windows.host  
  admin_server = example.windows.host  
  kpasswd_protocol = SET_CHANGE  
}  
  
[domain_realm]  
.users.example.com = USERS.EXAMPLE.COM  
users.example.com = USERS.EXAMPLE.COM  
.example.com = EXAMPLE.COM  
example.com = EXAMPLE.COM
```

And the settings to be used in the Oracle VDI Manager:

- Domain: `example.com`
- Username: `super-user@users.example.com`

Example of Multiple Tree Forests

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

- One tree containing the domain `central.vdi.example.com` (Forest Root) and a child domain `child.central.vdi.example.com`

- A second tree containing the domain `east.vdi.example.com`
- Both trees are part of the same forest (`central.vdi.example.com`)

In order to add this tree configuration as a Company in Oracle VDI Manager, first make sure that Kerberos has been configured correctly on the Oracle VDI hosts.

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

```
[libdefaults]
default_realm = CENTRAL.VDI.EXAMPLE.COM

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

[domain_realm]
.central.vdi.example.com = CENTRAL.VDI.EXAMPLE.COM
central.vdi.example.com = CENTRAL.VDI.EXAMPLE.COM
.child.central.vdi.example.com = CHILD.CENTRAL.VDI.EXAMPLE.COM
child.central.vdi.example.com = CHILD.CENTRAL.VDI.EXAMPLE.COM
.east.vdi.example.com = EAST.VDI.EXAMPLE.COM
east.vdi.example.com = EAST.VDI.EXAMPLE.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.

4.11. How to Reconfigure the User Directory Settings

User directory settings are configured in the Oracle VDI Manager in the Settings category and Company subcategory.

4.11.1. Defining the User Directory

The instructions to define the user directory are described in section [Section 4.1, “About User Directory Integration”](#).

4.11.2. Changing the Security Level

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

1. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. Select a company and go to the LDAP or Active Directory tab (depending on the user directory type).
3. Click Edit for the Security Level to launch the wizard.
4. Switch to another security level and modify the other settings if necessary, such as the port, the user name, and the password.
5. 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. To switch between LDAP and Active Directory types, use the `vda directory-setprops` command.

In the case of LDAP connection type, it is not possible change the security level if additional hosts have been defined (see [Section 4.11.5, “Adding Fallback Hosts”](#)).

4.11.3. 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. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. Select a company and go to the LDAP or Active Directory tab (depending on the user directory type).
3. Click Edit for the Security Level to launch the wizard.
4. Edit the user name and the password as necessary.
5. Click Next to review your choices before completing the configuration update.

4.11.4. Updating the Server SSL Certificates

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

1. In the Oracle VDI Manager, go to **Settings** → **Company**.
2. Select a company and go to the LDAP or Active Directory tab (depending on the user directory type).
3. 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.

4. Click Next to review your choices before completing the configuration update.

4.11.5. 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.

4.12. 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 Oracle VDI Center. Global Oracle VDI Centers extend the basic "hotdesking" experience known from a single Oracle VDI environment to encompass multiple Oracle VDI 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 [section Section 4.13, “How to Prepare a User Directory for Global Oracle VDI Centers”](#).

4.12.1. Oracle VDI Center - Home and Foreign

An **Oracle VDI Center** is an individual Oracle VDI environment consisting of one or more Oracle VDI 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.

4.12.2. 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.

4.12.3. 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 user name 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 releases of Oracle VDI. 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 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.

4.13. 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 side. However, the Oracle VDI Center data needs to be populated in your user directory according to the schema used by Oracle VDI, see [Section 4.13.1, “Oracle VDI Center Data Schema”](#).

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.

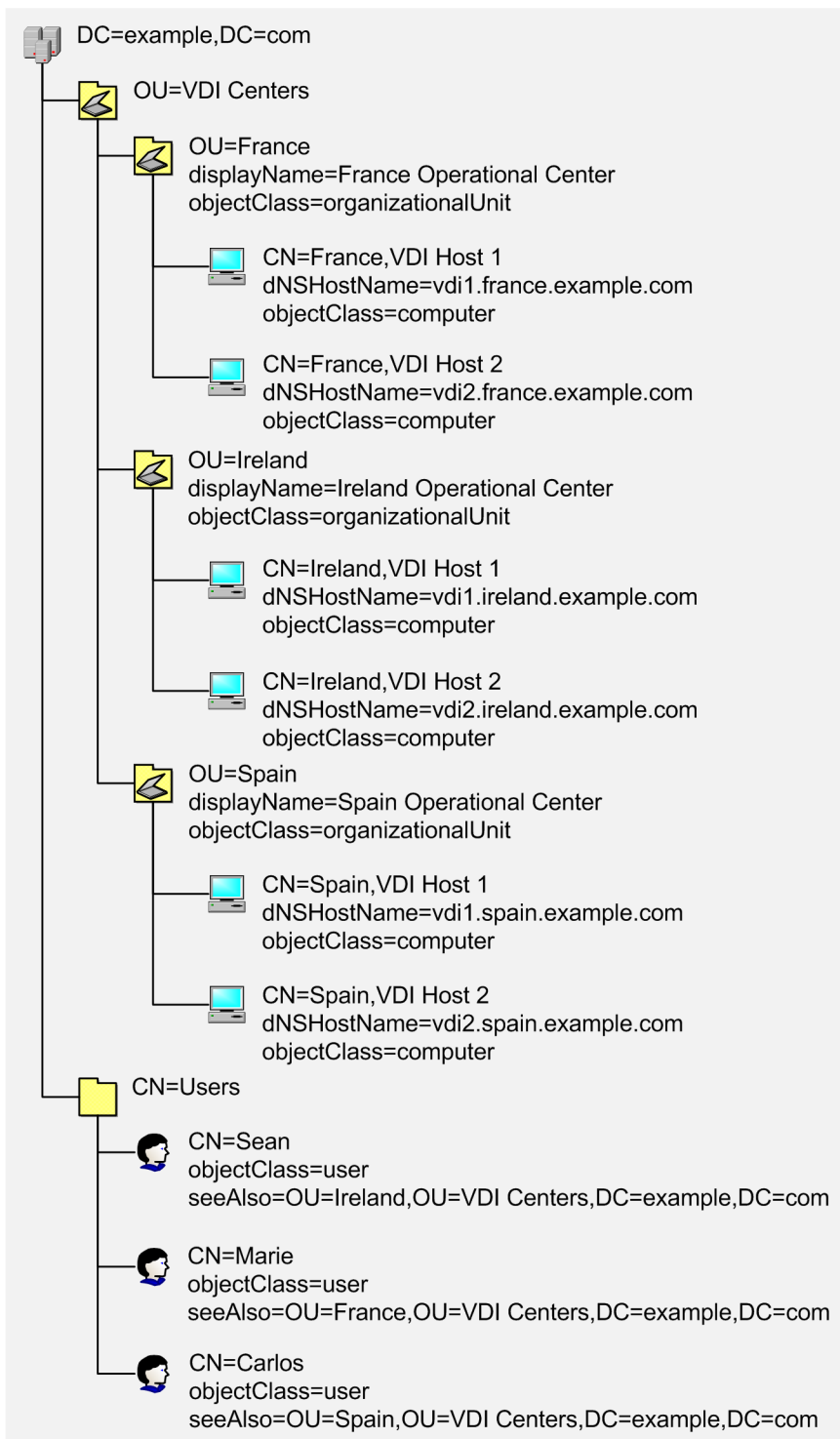
See [Section C.1, “How to Edit LDAP Filters and Attributes”](#) for the necessary steps and the default LDAP filters and attributes for Global Oracle VDI Centers.

4.13.1. Oracle VDI Center Data Schema

Oracle VDI 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 Oracle VDI Host objects, which are the Oracle VDI hosts composing the Oracle VDI Center.
- **Oracle VDI Host:** an Oracle VDI Host is a `computer` object (on Active Directory) or a `device` object (on other LDAP directories). The hostname/IP address of the Oracle VDI Host is taken from the `dNSHostName` attribute (on Active Directory) or the `ipHostNumber` attribute (on other LDAP directories). If none of these 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.

[Figure 4.1, “Active Directory Example”](#) shows an example global Oracle VDI Center in Active Directory.

Figure 4.1. Active Directory Example

4.14. About LDAP Filters and Attributes

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

This section 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 [Section C.1, “How to Edit LDAP Filters and Attributes”](#) for details about how to edit those filters.

4.14.1. Searching for Users and Groups

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

The search logic works as follows:

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

4.14.2. Requesting a Desktop for a User

When requesting a desktop for a user, Oracle VDI first needs to find the user DN that matches the user ID before resolving the pool and 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`.

4.14.3. 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.

Oracle 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`.

4.14.4. LDAP Cache

In order to improve the performance and reduce the load on the user directory, the user and group entries retrieved by Oracle 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.

4.15. Removing a Company

You can remove a company through the **All Companies** page in Oracle VDI Manager. You cannot remove a company that has pools. you must delete all pools for a company before you can remove it.

Chapter 5. Configuring Desktop Providers and Virtualization Platforms

Table of Contents

5.1. Oracle VDI Hypervisor	61
5.1.1. About the Oracle VDI Hypervisor	61
5.1.2. System Requirements for the Oracle VDI Hypervisor	62
5.1.3. Updating the Oracle VDI Hypervisor	64
5.1.4. How to Install the Oracle VDI Hypervisor	64
5.1.5. How to Configure the VRDP Port Range	65
5.2. Microsoft Hyper-V and Remote Desktop Services	66
5.2.1. Microsoft Hyper-V	66
5.2.2. Microsoft Remote Desktop Services	66
5.2.3. Preparing a Windows Server	69
5.3. VMware vCenter	71
5.3.1. System Requirements for VMware vCenter	71
5.3.2. How to Set Up a VMware ESX Server	71
5.3.3. How to Set Up a VMware vCenter Server	71
5.3.4. How to Test the Platform Setup	72
5.4. About Generic Desktop Providers	73
5.5. About Sun Ray Kiosk Session Providers	73
5.6. Storage	74
5.6.1. Supported Storage Server Platforms	74
5.6.2. About Storage Clustering	75
5.6.3. How to Set Up an Oracle Solaris Storage Server	76
5.6.4. How to Set Up a Sun Storage 7000 Unified Storage System	77
5.6.5. How to Replicate and Replace a Sun Unified Storage System	77
5.6.6. How to Replicate and Replace an Oracle Solaris Storage System	78
5.7. Desktop Providers	79
5.7.1. How to Create Desktop Providers	79

5.1. Oracle VDI Hypervisor

5.1.1. About the Oracle VDI Hypervisor

Oracle VDI bundles and supports a specific Oracle VM VirtualBox release, which is referred to as the *Oracle VDI Hypervisor*. See [Section 5.1.2, “System Requirements for the Oracle VDI Hypervisor”](#).

The Oracle VDI Hypervisor provides the following Oracle VDI desktop provider features.

Shared Memory

Shared Memory (also known as memory ballooning) is a feature that enables more desktops to run on Oracle VDI Hypervisor hosts. By specifying an amount of memory to be shared between desktops, the Oracle VDI hypervisor host's memory can be automatically redistributed between desktops as required. The Shared Memory feature can be activated on a per-pool basis on the **Pool** category, **Settings** tab by specifying a value greater than 0% (up to 75%).

The memory sharing percentage is the amount of memory that can be used for other desktops if a desktop does not require the full amount of memory for itself. For instance, if the desktop memory size is 1 GB and

memory sharing is set to 40%, the desktop will initially have around 600 MB of real memory. The other 400 MB will be made available to the desktop on demand.

Oracle VDI constantly monitors desktops with memory sharing enabled to ensure they don't run out of memory. If a desktop's free memory drops below 64 MB more usable memory will be provided. If a desktop has excessive amounts of free memory, some memory will be gradually taken away until the memory sharing percentage is reached. The changes to desktop memory will not be apparent to the guest OS.

Memory Paging

Memory Paging (also known as de-duplication of memory) is a feature that enables more desktops to run on Oracle VDI Hypervisor hosts. If several desktops have identical content in memory, pages will be used to consume real memory on the hypervisor only once. The desktops will reference the page and do not need physical memory for identical pages any more.

The Memory Paging feature can be activated on a per-pool basis on the **Pool** category, **Settings** tab.

5.1.2. System Requirements for the Oracle VDI Hypervisor

Oracle VDI includes release 4.0.10 of Oracle VM VirtualBox. For reasons of backward compatibility, you can continue to use some releases Oracle VM VirtualBox that were included in previous releases of Oracle VDI. In this release, the following are the only supported releases of Oracle VM VirtualBox:

- Oracle VM VirtualBox 4.0.10
- Oracle VM VirtualBox 3.2.12

To obtain the best performance, it is best to install and use the Oracle VDI Hypervisor that is bundled with this release.

The following are the supported installation platforms for the bundled Oracle VDI Hypervisor:

Operating System	Supported Releases
Oracle Linux (64-bit) on x86 platforms	5.6
Oracle Solaris (64-bit) on x86 platforms	Solaris 10 release 10/09 (update 8) or later Note: Solaris 11 is not supported.

All Oracle VDI Hypervisor hosts must have the virtualization extensions from AMD (AMD-V) and Intel (VT-x) enabled.

Customers can use new or existing hardware as long as the CPU it meets the x86 CPU requirements.

If the firewall is enabled on the Oracle VDI Hypervisor hosts, the following ports must be opened:

- Port 22 for SSH connections
- Port 443 for HTTPS connections
- Ports 49152 to 65534 for VRDP connections

The HTTPS ports is configurable when you install the Oracle VDI Hypervisor. The VRDP ports are only required if the VRDP protocol is used to connect to desktops. See [Section 6.1.7, "Choosing Between VRDP and MS-RDP"](#) for details. The range of ports used is configurable, see [Section 5.1.5, "How to Configure the VRDP Port Range"](#) for details.

5.1.2.1. System Requirements for the Oracle VDI Hypervisor on Oracle Solaris Platforms

On Solaris platforms, you must install the Entire distribution to get the libraries required by Oracle VDI. The Oracle VDI Hypervisor installation script warns you if `zfs_arc_min` is not set. The recommended setting for a dedicated Oracle VDI Hypervisor host is 512 MB.

To set 512 MB as the `zfs_arc_min`, log in as root and add the following in `/etc/system`:

```
set zfs:zfs_arc_min = 536870912
```

On Oracle Solaris platforms, the Oracle VDI Hypervisor requires specific packages to be installed in order to function correctly. The following are the required packages:

- `SUNWapch2r`
- `SUNWapch2u`
- `SUNWapch2d`

To check if a package is installed on the host, run the following command as root:

```
# pkginfo -x <package-name>
```

5.1.2.2. System Requirements for the Oracle VDI Hypervisor on Linux Platforms

On Oracle Linux platforms, the Oracle VDI Hypervisor requires specific packages to be installed in order to function correctly. The following are the required packages:

- `distcache.i386` (32-bit version)
- `distcache.x86_64` (64-bit version)
- `gcc`
- `glibc-devel`
- `glibc-headers`
- `httpd`
- `kernel-devel` or `kernel-uek-devel` (depending on the Linux kernel)
- `kernel-headers` or `kernel-uek-headers` (depending on the Linux kernel)
- `libgomp`
- `mod_ssl`
- `SDL`

To check if a package is installed on the host, run the following command as root:

```
# rpm -q <package-name>
```

To install a required package, run the following command as root:

```
# yum install <package-name>
```

5.1.2.3. Storage Requirements for the Oracle VDI Hypervisor

The Oracle VDI Hypervisor requires a storage server to store the virtual machines used by Oracle VDI. This server is in addition to the Oracle VDI Hypervisor host itself.

See [Section 5.6.1, “Supported Storage Server Platforms”](#) for details of what is supported.

For detailed instructions on storage preparation, see:

- [Section 5.6.4, “How to Set Up a Sun Storage 7000 Unified Storage System”](#)
- [Section 5.6.3, “How to Set Up an Oracle Solaris Storage Server”](#)

5.1.3. Updating the Oracle VDI Hypervisor

You update the Oracle VDI Hypervisor by installing the new release bundled with an Oracle VDI release. When you update, the existing Oracle VDI Hypervisor must first be uninstalled. When you install the new release, the installation script prompts you to uninstall existing release. Alternatively, you can uninstall the existing release manually with the `vb-install -u` command.

When you uninstall the Oracle VDI Hypervisor, you are prompted to shut down any virtual machines that are running. You must shut down all running virtual machines before uninstalling. You are also prompted to unregister and delete the virtual machines. If you choose to unregister and delete, you cannot register the virtual machines again after the update.

After updating the Oracle VDI Hypervisor, you must update the guest additions in all templates and desktops.

5.1.4. How to Install the Oracle VDI Hypervisor

This section describes how to install the release of Oracle VM VirtualBox that is bundled with Oracle VDI.

Before you begin, check that the host meets the installation requirements, see [Section 5.1.2, “System Requirements for the Oracle VDI Hypervisor”](#).

If you are updating an Oracle VDI Hypervisor, see [Section 5.1.3, “Updating the Oracle VDI Hypervisor”](#).

About the Oracle VDI Hypervisor Installation Script

The Oracle VDI Hypervisor is installed and uninstalled with the `vb-install` script. In Oracle VDI release 3.3, the installation process has changed for legal reasons. The Oracle VDI Hypervisor is delivered as two packages, an open source package (the Base Pack) and an Oracle proprietary package (the Extension Pack).

The Oracle VDI software archive only includes the Extension Pack. When you run the `vb-install` script, the script automatically downloads the Base Pack using the `wget` program. If this fails, for example due to network connectivity problems, the script exits and you must manually download the Base Pack. It might take as long as ten minutes for the script to exit. You can download the Base Pack and the Extension Pack from the [Oracle VDI download page](#).

When you install the Oracle VDI Hypervisor, you are prompted for a user name, a password, and a port number to use for SSL connections. The user name and password are for the user that runs the hypervisor on the host. By default, the root user is used. The Oracle VDI Hypervisor has the facility for suspending and resuming virtual machines and running the hypervisor as root is the easiest way to guarantee that the suspend and resume functionality works. If you use a different user, the user must have a home directory and the home directory must not be shared between several systems that run Oracle VM VirtualBox. By default, port 443 is used, but you can choose a different port.

The following table lists the parameters that can be used with `vb-install` script to automate the installation on several servers with a script.

Parameter	Description
-f	Forces existing virtual machines to be deleted.

Parameter	Description
-n <user>	Specifies the user name of the Oracle VM VirtualBox user.
-o <port>	Specifies the SSL port to use to connect to Oracle VM VirtualBox. The default is port 443.
-p	Requires input from standard input (stdin) to enter the password in a secure way.
-u	Uninstalls the currently installed release of Oracle VM VirtualBox.

Steps

1. Log in as root on the virtualization host.
2. Download the main Oracle VDI software archive.
3. Unzip the main Oracle VDI software archive and change working directory to the extracted directory.

- On Oracle Solaris hosts:

```
# unzip vda_3.3_solaris_amd64.zip
# cd vda_3.3_solaris_amd64
```

- On Oracle Linux hosts:

```
# unzip vda_3.3_linux.zip
# cd vda_3.3_linux
```

4. Unzip the Oracle VM VirtualBox archive and change working directory to the extracted directory.

```
# unzip vbox_4.0.zip
# cd vbox_4.0
```

5. Install Oracle VM VirtualBox.

```
# ./vb-install
```

The installation script downloads the Oracle VM VirtualBox Base Pack, and then installs both the Base Pack and the Extension Pack. After you accept the software license agreement, you complete the installation by providing a user name, a password, and a port number to use for SSL connections.

If the Base Pack download fails, you must manually download it from the [Oracle VDI download page](#). Make sure you download the release that is bundled and supported with this release of Oracle VDI. Copy the Base Pack to the same folder as the `vb-install` script, and then run the script again.

5.1.5. How to Configure the VRDP Port Range

If the VRDP protocol is selected as the desktop protocol, Oracle VDI makes connections to Oracle VDI Hypervisor hosts on a range of ports between 49152 to 65534. Use the `vda settings-setprops` command to configure the VRDP port range.

- Run the following command as root.

```
# /opt/SUNWvda/sbin/vda settings-setprops -p \
vbox.rdp.port.range="<StartPort>-<EndPort>"
```

For example:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p \
vbox.rdp.port.range="50000-60000"
```

5.2. Microsoft Hyper-V and Remote Desktop Services

5.2.1. Microsoft Hyper-V

Oracle VDI provides users access to virtual machines hosted by Microsoft Hyper-V. Microsoft Hyper-V can be installed either as a free stand-alone product, or it can be enabled as the Hyper-V role in Windows Server.

The Microsoft Hyper-V desktop provider is remotely managed by Oracle VDI. To enable communication between Oracle VDI and the Windows Server hosting Microsoft Hyper-V, the Windows Server needs to be prepared using the same preparation as for a Microsoft Remote Desktop provider. See [Section 5.2.3, “Preparing a Windows Server”](#) for more details.

Because Microsoft software is not included as part of the Oracle VDI package, Oracle Support contracts do not cover third party software related issues.

5.2.1.1. System Requirements for Microsoft Hyper-V

The following are the supported virtualization platforms for the Microsoft Hyper-V desktop provider:

- Microsoft Hyper-V Server 2008 R2
- Microsoft Windows Server 2008 R2

System requirements for the Hyper-V server:

- [Microsoft Hyper-V Server 2008](#)
- [Microsoft Windows Server 2008 with SP2](#)
- [Microsoft Windows Server 2008 R2](#)

To install the **Hyper-V role**, please refer to the Microsoft [Hyper-V Getting Started Guide](#).

To install the **standalone product**, please refer to the [Microsoft Hyper-V Server 2008 site](#).

5.2.1.2. Storage Requirements for Microsoft Hyper-V

Microsoft's Hyper-V requires a storage server to store the virtual machines used by Oracle VDI. This server is in addition to the Hyper-V host itself.

Like the Oracle VDI Hypervisor, the Microsoft Hyper-V desktop provider takes advantage of iSCSI and ZFS as a part of Oracle Solaris and the Sun Unified Storage. Virtual disks can be stored on the Oracle VDI host, but for a production environment a Microsoft Hyper-V desktop provider requires a separate storage host.

See [Section 5.6.1, “Supported Storage Server Platforms”](#) for details of what is supported.

For detailed instructions on storage preparation, see:

- [Section 5.6.4, “How to Set Up a Sun Storage 7000 Unified Storage System”](#)
- [Section 5.6.3, “How to Set Up an Oracle Solaris Storage Server”](#)

5.2.2. Microsoft Remote Desktop Services

Oracle VDI provides users access to Terminal Services or Remote Desktop Services sessions provided by Windows Server 2003 and Windows Server 2008. Oracle VDI relies on some Microsoft tools being implemented along with Remote Desktop Services to provide advanced features such as farm or cluster of Remote Desktop Services hosts (RDS hosts) with load balancing and session reconnection.

**Note**

In Windows Server 2008 R2, Terminal Services (TS) has been renamed Remote Desktop Services (RDS).

5.2.2.1. System Requirements for Microsoft Remote Desktop Services

The following are the supported virtualization platforms for the Microsoft Remote Desktop desktop provider:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2003 Enterprise Edition

System requirements for the Remote Desktop server:

- [Windows Server 2008 R2 system requirements](#)
- [Windows Server 2003 system requirements](#)

5.2.2.2. Microsoft Terminal Services on Windows Server 2003

Oracle VDI provides access to Terminal Services sessions delivered by:

- A single server running Windows Server 2003
- A cluster of servers with the following characteristics:
 - All servers running Windows Server 2003, any edition
 - The cluster is a Microsoft Network Load Balancing (NLB) cluster, which provides load balancing among servers

Microsoft Session Directory can be used to enable users to reconnect to existing sessions.

To install the Remote Desktop Services role on Windows Server 2003, refer to:

<http://technet.microsoft.com/en-us/windowsserver/dd299436.aspx>

Microsoft reference documentation:

- [Session Directory and Load Balancing Using Terminal Server](#)
- [Network Load Balancing Clusters](#)

5.2.2.3. Microsoft Remote Desktop Services on Windows Server 2008

Oracle VDI provides access to Remote Desktop Services sessions delivered by:

- A single server running Windows Server 2008
- A farm of servers with the following characteristics:
 - All servers running Windows Server 2008
 - Microsoft TS Session Broker is used to enable load balancing and enable users to reconnect to existing sessions.

As described in Microsoft documentation, preliminary load balancing may be provided using DNS round robin or Microsoft Network Load Balancing (NLB) or a hardware load balancer.

To install the Remote Desktop Services role on Windows Server 2008 refer to <http://www.microsoft.com/windowsserver2008/en/us/rds-product-home.aspx>.

Microsoft reference documentation:

- [TS Session Broker Load Balancing Step-by-Step Guide](#)
- [Network Load Balancing Step-by-Step Guide: Configuring Network Load Balancing with Terminal Services](#)

5.2.2.4. Microsoft Remote Desktop Provider RDS Farm Management

If you have RDS hosts belonging to a farm or a NLB cluster, how you configure a Microsoft Remote Desktop provider depends on whether or not you want to be able to view session information or CPU and memory load information in Oracle VDI Manager or on the command line.

If you want to view session and load information in Oracle VDI, configure the Microsoft Remote Desktop provider as follows:

1. Prepare each RDS host, as described in [Section 5.2.3, "Preparing a Windows Server"](#).
2. In the New Provider Wizard, add all the RDS hosts in the farm using the **Specify New Host** option.
3. Specify the host name or IP address, SSL port, and administrator credentials for each RDS host.

Oracle VDI needs to contact each individual RDS host in order to register the local administrator's credentials and the SSL certificate for that host so that the RDS hosts can communicate session and load information with Oracle VDI.

With this configuration, Oracle VDI detects the information about the farm by querying the first RDS host of the provider. The detected farm name is returned to the remote client when users try to access a session. The session can be started on any host participating in the farm.

If you **do not** want to view session and load information in Oracle VDI, configure the Microsoft Remote Desktop provider as follows:

1. In the New Provider Wizard, select the **Specify Remote Desktop Server Farm** option.
2. Enter the DNS name or IP address of the RDS farm or NLB cluster.

With this configuration, the configured farm name is returned to the remote client when users try to access a session.

5.2.2.5. Limitations of Microsoft Remote Desktop Providers and Pools

Due to the specificity of Remote Desktop Services compared to the other virtualization backends, some restrictions apply to the actions and settings offered by the desktop providers and pools:

- The provider may contain multiple RDS hosts if they are members of the same Network Load Balancing cluster or Session Broker farm. See the section about supported platforms. In this case, Microsoft NLB or Microsoft Session Broker are responsible for the load balancing across the hosts. Oracle VDI does not perform any such load balancing.
- The provider may contain a single stand-alone RDS host.
- A given RDS host can only participate in one provider.
- Each Microsoft Remote Desktop provider can have one pool only.

- The pool does not offer any cloning capabilities. The Remote Desktop Services server or farm is responsible for opening new RDS sessions when new users connect.
- The type of assignment in the pool is always flexible. Session reconnection will be offered if the RDS setup is correctly configured for it, but is not the responsibility of Oracle VDI. See section about supported platforms.
- The list of desktops displayed for this pool correspond to the aggregated list of RDS sessions from all RDS hosts associated with the provider. All RDP sessions, whether they come from Oracle VDI or not, are displayed.
- Groups or users may be assigned to RDS pools but you cannot manually assign a user to an RDS desktop.

5.2.3. Preparing a Windows Server

After installing Microsoft Hyper-V or Microsoft Remote Desktop Services you must prepare your Windows server to communicate with Oracle VDI. Oracle VDI does not require any agents to be installed on the Windows servers, instead Oracle VDI communicates with Windows servers using Windows Remote Management (WinRM) over HTTPS (a secure protocol). For HTTPS, WinRM requires a server certificate to operate properly. This certificate is used for encryption of the communication channel. For more details, see [Windows Remote Management](#) or [Configuration and Security](#) in the Microsoft documentation.

Preparing the Windows server for communication with Oracle VDI is a two-step process. First, you must generate the self-signed certificate using the Microsoft Internet Information Services (IIS) 6.0 Resource Kit Tools (Step 1, below). Then configure `winrm` to listen for HTTPS requests (Step 3, below).



Note

These steps are necessary for RDS (or Terminal Services) hosts so that critical information about the server (including CPU usage, memory usage, and number of user sessions) can be displayed in Oracle VDI Manager and on the command line. If you do not want to view session or load information in Oracle VDI, the following steps are not necessary, see [Section 5.2.2.4, “Microsoft Remote Desktop Provider RDS Farm Management”](#) for more details. The delivery of desktop sessions from RDS pools is still provided by a regular RDP connection. For information about how to configure the RDP settings per desktop pool, see [Section 6.1.3, “How to Configure RDP Options Per Pool”](#).



Caution

Run the following commands in Command shell and **not** PowerShell.

1. Generate a self-signed certificate on the Windows server.

Use the `selfssl.exe` tool which is part of the IIS 6.0 Resource Kit and can be downloaded from the [Microsoft Support web site](#).

- a. Copy `selfssl.exe` to your Windows Server.
- b. Create a self-signed certificate:

```
C:\Program Files\IIS Resources\SelfSSL\selfssl /T /V:<days>
```

The parameter `/V:` dictates the number of days the certificate will be valid. There is no maximum value.

- c. Run the `certutil` command, and make note of the Cert Hash of the new certificate:

```
certutil -store MY
```



Note

If the Windows server and the Oracle VDI servers are not in time sync, you might not be able to connect Oracle VDI to the server because the certificate is not valid for the delta between both servers.

2. (Windows Server 2003 only) Install WS-Man (WinRM).



Note

Windows Server 2008 and Hyper-V Server 2008 come with WinRM pre-installed.

- Download the WS-MAN v1.1. installation file (`WindowsServer2003-KB936059-x86-ENU.exe`) from www.microsoft.com.
- Proceed to the installation by running the installation file `WindowsServer2003-KB936059-x86-ENU.exe`.

3. Configure Windows Remote Management for HTTPS.

The `winrm` tool is used to configure remote management settings on the server. You must specify the certificate hash to be used, and the authentication settings to enable Oracle VDI to send requests.

- Create a listener on the Windows Server.

In a command shell run:

```
winrm create winrm/config/listener?Address=IP:<HYPER_IP>+Transport=HTTPS ^
@{Hostname="<HOST>";CertificateThumbprint="<CERTHASH>";Port="443"}
```

- Replace `<HYPER_IP>` with the IP address of the Windows Server.
- Replace `<HOST>` with the Computer Name of the Windows Server.
- Replace `<CERTHASH>` with the Cert Hash value, with no spaces, noted from the self-signed certificate created with `selfssl`.

- Open that port so that the Windows Server can receive requests from Oracle VDI:

```
netsh firewall add portopening TCP 443 "Oracle VDI Remote Management"
```

Port 443 is the port Oracle VDI listens on by default.

- Enable Basic authentication on the server by running the command:

```
winrm set winrm/config/service/auth @{Basic="true"}
```



Note

If you use a port other than 443 for Oracle VDI communication with Microsoft Hyper-V or RDS, you must remember to specify this port when adding the host in the Oracle VDI Manager.

5.3. VMware vCenter

5.3.1. System Requirements for VMware vCenter

The following are the supported versions of VMware vCenter for the VMware vCenter desktop provider:

- VMware vCenter server 4.1 (including update 1)
- VMware vCenter server 4.0 (including all updates)
- VMware VirtualCenter server 2.5 (including all updates)

With the VMware vCenter desktop provider, storage is managed by vCenter. Any storage qualified by VMware can be used, see the [VMware Compatibility Guide](#) for details.

5.3.2. How to Set Up a VMware ESX Server

VMware ESX Server is a Linux-based appliance that provides a virtualization platform by abstracting CPU resources, storage, and memory of a physical host into multiple virtual machines.

Steps

1. Power on the host machine with the VMware ESX Server CD in the CD drive.

If available, you can also use remote management applications such as the Integrated Lights Out Manager (ILOM) to drive the installation.

2. During installation, you can safely rely on the suggested default settings.

Refer to the [VMware ESX Server 3 and VirtualCenter Installation Guide](#) for more details about installing VMware ESX Server.

3. After installation, install the VMware Virtual Infrastructure Client so that you can access the VMware ESX server.

Refer to the [VMware ESX Server 3 and VirtualCenter Installation Guide](#) for more details about installing the VMware Virtual Infrastructure Client.

5.3.3. How to Set Up a VMware vCenter Server

VMware vCenter provides central management of several VMware ESX servers, and can be installed on a physical or virtual host. Refer to the [VMware ESX Server 3 and VirtualCenter Installation Guide](#).

Steps

Once VMware vCenter is installed, complete the following configuration steps:

1. Add the VMware ESX server as a managed host.

In VMware vCenter select the data center where the host will be added. In the menu bar go to **Inventory, Datacenter**, then **Add Host**, and follow the instructions.

2. Install the Windows System Preparation Tools for Windows XP.

These tools can be downloaded from the following Microsoft web sites:

- [Windows XP Service Pack 2 Deployment Tools](#)

- [Windows XP Service Pack 3 Deployment Tools](#)

3. Extract the Sysprep tools from the CAB into the following directory:

```
C:\Documents and Settings\All Users\Application Data\VMWare\VMWare VirtualCenter\sysprep\xp
```

For more information about installing the Microsoft Sysprep Tools, see the [VMware Basic System Administration Guide](#).

4. Verify that the server is configured for access to the web services API.

Oracle VDI takes advantage of the web services API provided by the VMware Infrastructure SDK to communicate through HTTPS with VMware vCenter.

- a. Verify that the VMware vCenter Webaccess component is installed and configured.
- b. Verify that Port 443 (HTTPS) is enabled in any firewall that may be active on the system.
- c. As a simple test, go to [https:// <vCenter Host> /mob](https://<vCenter Host>/mob). If everything works correctly, you will have access to the VMware Infrastructure SDK browser (after providing the VMware administrator user name and password).

5.3.4. How to Test the Platform Setup

It is highly recommended to test the virtualization platform configuration, before setting up the Oracle VDI components. A quick manual test consists of cloning a virtual machine using the desired template and customization specification followed by a remote access to the cloned virtual machine via RDP.

Before You Begin

In order to test the platform setup, you must first create a virtual machine. See [Section 6.5.2, “How to Create Virtual Machines \(VMware vCenter\)”](#) for more details.

Steps

1. Open the Virtual Infrastructure Client.
2. Right-click on the desired template and select **Deploy Virtual Machine from this Template**.
 - a. The wizard will ask you to specify a name for the new virtual machine. Select the desired host/cluster and datastore with sufficient free space.
 - b. On the **Guest Customization** step, select the **Customize Using an Existing Customization Specification** option, then choose the customization specification you just created from the list.
 - c. Review your selections, and click **Finish** to begin cloning.

3. After the cloning has finished, select the new virtual machine and power it on.

After some time you should see its IP address and host name appear in the Virtual Infrastructure Client. Make sure that it has a unique IP address and that the host name corresponds to the virtual machine name.

4. On the VMware vCenter server, open a Remote Desktop Connection by clicking **Start, All Programs, Accessories, Communications, then Remote Desktop Connection**.
 - a. In the **Remote Desktop Connection** window, enter the IP address of the newly cloned virtual machine, and click **Connect**.

- b. If everything is configured correctly, a full-screen remote desktop session to your virtual machine should be displayed.

5.4. 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 an Oracle 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 [Section 6.6.4, “How to Import Individual Windows PCs”](#) for detailed instructions.

5.5. About Sun Ray Kiosk Session Providers

Oracle VDI Sun Ray Kiosk Session providers enable you to use an existing Sun Ray Kiosk Mode session type instead of a regular Oracle VDI desktop. A pool for a Sun Ray Kiosk Session provider enables you to specify arguments for the kiosk session. If a user, group or token is assigned to a kiosk pool, the kiosk session is listed on users' desktop selector screen as well as their regular Oracle VDI desktops. When the kiosk session ends, users are returned to the login screen.

Sun Ray Kiosk Session providers enable you to provide access to types of sessions that are not available with Oracle VDI itself, for example to connect to a remote desktop using a different broker such as the Sun Ray VMware View connector, or to provide access to a web-based application in a locked-down web browser.

Each Sun Ray Kiosk Session provider corresponds to one kiosk session type that is available in the Oracle VDI Center. Each pool connected to a Sun Ray Kiosk Session provider can have its own specific settings for the kiosk session, see [Section 6.1.6, “How to Configure Kiosk Settings \(Sun Ray Kiosk Provider\)”](#).

Kiosk Session Environment

The Sun Ray Kiosk Session provider makes some information available that can be used in kiosk session scripts to detect whether the kiosk session is being run by Oracle VDI. This is useful for integrating different kiosk sessions with Oracle VDI, for example to provide a single sign-on capability, or to make the different sessions operate as an integrated desktop where users have multiple desktops. The following information is available:

- The **user name** of the logged in Oracle VDI user is available in the `VDA_USER` environment variable.
- The **password** of the Oracle VDI user can be read from standard input by the kiosk session process.
- The **domain** of the logged in Oracle VDI user is available in the `VDA_DOMAIN` environment variable.
- The **X11 display** to use for the kiosk session is available in the `VDA_DISPLAY` environment variable.

If this is not set, a full screen display on the current display is assumed.

- The **screen location** in which the kiosk session is displayed, in X11 geometry format, is available in the `VDA_GEOMETRY` environment variable.

If this is set, the session runs in a window on the display specified by `VDA_DISPLAY`. If no geometry is set, the session runs full-screen on the specified display.

The following is a simple example of how this information might be used in a kiosk session script.

```
theUser="$VDA_USER"  
thePassword=  
theDomain="$VDA_DOMAIN"  
theDisplay="$VDA_DISPLAY"  
theGeometry="$VDA_GEOMETRY"  
read thePassword
```

Restrictions on Kiosk Session Types

There are restrictions on the kiosk session types that can be used with Sun Ray Kiosk Session providers. Most of these are because Oracle VDI itself runs under Sun Ray Kiosk Mode. A kiosk session run by a Sun Ray Kiosk Session provider is a sub-process of the main Oracle VDI kiosk session. Note the following:

- The Sun Java Desktop System 3 and the Common Desktop Environment kiosk types (available on Oracle Solaris platforms only) cannot be used with Oracle VDI, even though they can be selected for use with a Sun Ray Kiosk Session provider.
- Kiosk session types that do not use the `VDA_DISPLAY` or `VDA_GEOMETRY` environment variables to detect the Oracle VDI session might not function correctly if users can access multiple desktops.
- Kiosk pre-session or post-session scripts that must be run by root are not supported.

Kiosk session types that have the `KIOSK_SESSION_PRE` or `KIOSK_SESSION_POST` keys set cannot be used with Oracle VDI.

- When the kiosk session exits, temporary files and folders in the kiosk user's home directory are not cleaned up. Do not use kiosk session types that create temporary files and folders, as these might affect other kiosk sessions of the same or different types.
- Processes started as background processes by the kiosk session continue to run until the Oracle VDI session ends.
- Kiosk commands and functions that operate on the kiosk session, operate on the containing Oracle VDI session, as follows:
 - The `kioskrestart(1)` command cannot be used to end a kiosk session. This command ends the entire Oracle VDI session.
 - Commands such as `kioskparam(1)` or `kioskstatus(1)` cannot be used to query the configuration or status of the kiosk session. These commands only report the parameters of the Oracle VDI kiosk session.
 - If the kiosk session starts any process as a critical process, the entire Oracle VDI session ends when the critical process exits. The kiosk sessions themselves are not run as critical processes.
 - Kiosk application lists do not work correctly with a kiosk session run by the Sun Ray Kiosk Session provider. Do not use "desktop-style" session types that support configurable application lists.

5.6. Storage

5.6.1. Supported Storage Server Platforms

The Oracle VDI and Microsoft Hyper-V desktop providers require storage that is managed by Oracle VDI. The following are the supported storage servers:

- Oracle Solaris 10 10/09 x86 (64-bit) and later



Note

Oracle Solaris 11 and Oracle Solaris on SPARC platforms are not supported.

- Sun Storage 7000 series Unified Storage Systems 2009.Q2.5.1 and later

For Sun Storage 7000 series Unified Storage Systems, note the following:

- Oracle VDI does not support disabling the write cache without write SSDs (Logzilla).

If the write cache is enabled and write SSDs are present, the write SSDs are not used. See [Section 8.4.2, "About ZFS Storage Caches"](#) for more information on write caching.

- Oracle VDI supports only the default pool.

Use projects to separate your areas of concern.

For more information about supported storage, see the following:

- [Oracle Solaris 10 10/09 documentation](#)
- [Sun Unified Storage 7000 Series whitepapers and documentation](#)

5.6.2. About Storage Clustering

Oracle VDI supports active-passive as well as active-active storage clusters starting with firmware 2010.Q1.0.0. Clustered storage is managed by Oracle VDI the same way as normal storage, simply add the storage via the **Add Storage** wizard. The following paragraphs provide some insight to the necessary management in Sun Storage 7000 series Unified Storage Systems.

A storage cluster introduces redundancy for the server components of a storage including CPU, memory, main board, network cards, but does not increase the redundancy of the disks or their controllers. That is taken care of by the JBODS and the RAID levels used.

The two storage servers in the cluster (called 'heads') are connected over a special card, the Clustron, which allows the heads to exchange state and configuration information and to detect a failed head.

A *resource* is a core concept of clustering, and is typically either a network interface or a storage pool. To ensure availability, the resource is taken over by a head if the other head fails.

The main configuration steps when setting up a cluster are to define the resources, which is performed the same way as in a single setup (**Configuration, Storage** or **Configuration, Network**), and to assign a head as the resource owner (**Configuration, Cluster**).

A cluster is called "active/passive" if only one head owns all resources. A cluster is called "active/active" if both heads own resources. While the performance of an active/passive cluster does not degrade if one head fails, both heads of an active/active cluster are actively processing requests during normal operation resulting in a better utilization of the available hardware.

Identical hardware available on both storages can only be used to create one resource owned by one head. For example, if you configure a 192.168.100.100 interface using the nge0 device and assign head1 as its owner, head2 will use its nge0 device to take over the 192.168.100.100 interface in case head1 fails. To be able to do so the nge0 device must be unused on head2.

Another constraint to be noted about clustered interfaces - they must be statically configured, you cannot use DHCP.

A typical setup for two storages with 4 network devices each and array:

	Head1	Head2
nge0	owner	-
nge1	owner	-
nge2	-	owner
nge3	-	owner
Array 1	owner	-
Array 2	-	owner

nge0 and 1 as well as nge2 and 3 are typically trunked / aggregated.

For more information about Sun Storage 7000 series Unified Storage Systems and clustering, refer to the Administration Guide:

- PDF Format - [Sun Storage 7000 series Unified Storage Systems](#)
- Online Help Format - https://your_storage_DNS_or_IP:215/wiki/index.php/Configuration:Cluster

5.6.3. How to Set Up an Oracle Solaris Storage Server

An Oracle Solaris storage host must be an x86 system. Each virtual disk is represented by a ZFS volume, and the volumes are stored in a ZFS pool that is accessed by Oracle VM VirtualBox through iSCSI. The management of the ZFS volumes is done by Oracle VDI and requires SSH root access to the ZFS storage server and a ZFS pool on that server.

Steps

1. Install the Oracle Solaris operating system.

The Oracle Solaris installer offers you the option to use UFS or ZFS for the root file system. If the storage server contains multiple disks and the other disks are exclusively used for the Oracle VDI ZFS pools, either of the two choices is fine. If only one disk is available, choose ZFS.

2. Enable root access.

- a. Edit the file `/etc/ssh/sshd_config` and change the line `PermitRootLogin no` to `PermitRootLogin yes`
- b. Restart the SSHD service to implement the changes you made to the `sshd_config` file.

```
# svcadm restart ssh
```

3. (Optional) Create a ZFS pool.

If ZFS was selected during installation, the Oracle Solaris OS installer created a pool named `rpool`. This pool contains the root file systems and can also be used by Oracle VDI. Create a dedicated pool to separate the Oracle VDI data from the Oracle Solaris file systems.

```
# zpool create <pool name> <disk1> <disk2> <disk3> ...
```


4. Enable iSCSI access.

Type the following CLI command as root on the Oracle Solaris OS storage server.

```
# svcadm enable svc:/system/iscsitgt:default
```

5.6.4. How to Set Up a Sun Storage 7000 Unified Storage System

To see an up-to-date list of supported Sun Storage 7000 Unified Storage Systems, see [Section 5.6.1, "Supported Storage Server Platforms"](#).

Steps

1. Set up the system.

Follow the instructions provided by the "Quick Setup" manual of the Sun Unified Storage System.

2. (Optional) Update the Sun Unified Storage System Software.

Update the Sun Storage 7000 software to get important performance enhancements. See [Section 5.6.1, "Supported Storage Server Platforms"](#) to make sure the Sun Unified Storage System Software release is supported with your configuration.

3. Create a project.

Project names must be unique. Using a project name that exists on both heads of a Sun Storage 7000 cluster will lead to application failure in case of cluster failover.

5.6.5. How to Replicate and Replace a Sun Unified Storage System

Storage replication is a useful technique to increase storage server availability for lower budget Oracle VDI installations. After replicating a Sun Storage 7000 Unified Storage System, the Oracle VDI storage replace feature allows you to easily enable the replicated storage server from Oracle VDI Manager if, for some reason, the storage server fails.

Preparation

Configure the Sun Storage 7000 Unified Storage System for replication and replicate it. Replication is a built-in feature, and can be configured from the Sun Unified Storage System UI. The steps below are valid for 2010.Q1 firmware and above.

1. Add the target storage for the replication to the **Remote Replication** service. Go to **Configuration**, then **Services**.
2. Add a replication action to the project. Go to **Shares, Projects**, <project>, then **Replication**. The "Include Snapshots" option must be selected.

The ZFS structures are now replicated to the target storage as replication package.

Disaster Recovery

If a storage server fails, use the procedure below to replace and re-enable the storage server.

1. Disable the failed storage server.
 - a. In Oracle VDI Manager, go to **Desktop Providers**.

- b. Select a desktop provider that uses the failed storage server.
 - c. Go to the **Storage** tab, select the storage server, and click **Maintenance**.
 - d. Choose a time for the server to begin entering maintenance, or click **Now** to select the current time.
 - e. Click **OK** to submit the maintenance mode job.
2. In the Unified Storage System UI, convert the replication package to a local project.

Sever the replication connection of the replication target. Go to **Shares, Projects, Replica, <replication package>**, then **Replication**.
3. Enable the new storage server.
 - a. In Oracle VDI Manager, go to **Desktop Providers**.
 - b. Select a desktop provider that uses the failed storage server.
 - c. Go to the **Storage** tab.
 - d. Select the storage server to be replaced and click **Replace** to activate the **Replace Storage** wizard. Enter information about the new storage (replication target).
 - e. Select the new storage and click **Edit** to activate the **Edit Storage** wizard.
 - f. Enter additional information about the new storage.
 - g. Select the new storage and click **Enable**.

5.6.6. How to Replicate and Replace an Oracle Solaris Storage System

Storage replication is a useful technique to increase storage server availability for lower budget Oracle VDI installations. After replicating an Oracle Solaris storage system, Oracle VDI Manager enables you to replace a failed storage server with the replicated storage.

Preparation

Replicate the Oracle Solaris storage on another host.

1. Take a ZFS snapshot of the whole storage pool.

```
# zfs snapshot <pool>@rep
```

2. Take a ZFS snapshot of each volume in the storage pool.

Use the following command for each volume.

```
# zfs snapshot <pool>/<volume>@rep
```

3. Export the ZFS file system to the new storage host.

```
# zfs send -R <pool>@rep | ssh root@<host> zfs receive -dF <newpool>
```

4. Delete all ZFS snapshots on the original **and** new storage servers.

Use the following command for the whole storage pool.

```
# zfs destroy <pool>@rep
```

Use the following command for each volume.

```
# zfs destroy <pool>/<volume>@rep
```

Disaster Recovery

If a storage server fails, use this procedure to replace the storage server.

1. Disable the failed storage server.
 - a. In Oracle VDI Manager, go to **Desktop Providers**.
 - b. Select a desktop provider that uses the failed storage server.
 - c. Go to the **Storage** tab.
 - d. Select the storage server, and click **Maintenance**.
 - e. Choose a time for the server to begin entering maintenance, or click **Now** to select the current time.
 - f. Click **OK** to submit the maintenance mode job.
2. Enable the new storage server.
 - a. Go to the **Storage** tab.
 - b. Select the storage server to be replaced and click **Replace** to activate the **Replace Storage** wizard.
 - c. Enter the information about the new storage.
 - d. Select the new storage and click **Edit** to activate the **Edit Storage** wizard.
 - e. Enter additional information about the new storage.
 - f. Select the new storage and click **Enable**.

5.7. 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.

5.7.1. How to Create Desktop Providers

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Desktop Providers**.
2. In the **Desktop Providers** table, and click **New** to activate the **New Desktop Provider** wizard.

The wizard enables you to add multiple hosts and multiple storages in a loop.

Once you click **Finish**, the new desktop provider appears in the Oracle VDI Manager.

The **New Desktop Provider** wizard requires different information depending on the virtualization platform in use. For example, most desktop providers require a host IP address and administrator credentials. Oracle VDI or Microsoft Hyper-V desktop providers require a host and a storage.

3. • Oracle VDI and Microsoft Hyper-V desktop providers

You can 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, check the **Network** tab of the desktop provider to verify that the virtual network you created on your Microsoft Hyper-V machine is detected correctly.

• VMware vCenter desktop providers

You can view the VMware vCenter resource details, including data centers, VMware clusters, and datastores.

• Microsoft Remote Desktop providers

You can 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 [Section 6.6.4, “How to Import Individual Windows PCs”](#) for information about importing individual Windows PCs.

• Sun Ray Kiosk Session providers

You can view the details, including the kiosk session type. See [Section 5.5, “About Sun Ray Kiosk Session Providers”](#) for information about using kiosk session types with Oracle VDI.

Oracle VDI Desktop Provider CLI Steps

1. Create a new Oracle VDI desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-vb-create -p name=provider name
```

2. Add at least one Oracle VDI Hypervisor host to the Oracle VDI desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-add-host \  
-p host=VirtualBox host,username=user name for host provider name
```

3. Add at least one storage host to the Oracle VDI desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-add-storage \  
-p host=storage host,username=user name for host,zfspool=pool name provider name
```

The following example creates an Oracle VDI desktop provider with two hosts and one storage.

```
example% /opt/SUNWvda/sbin/vda provider-vb-create -p name="VB provider"  
  
example% /opt/SUNWvda/sbin/vda provider-add-host \  
-p host=my.first.vb.com,port=443,username=root "VB provider"  
  
example% /opt/SUNWvda/sbin/vda provider-add-host \  
-p host=storage.host,username=root,zfspool=zfs "VB provider"
```

```
-p host=my.second.vb.com,port=443,username=root "VB provider"

example% /opt/SUNWvda/sbin/vda provider-add-storage \
-p host=my.zfs.com,username=root,zfspool=vda_zfs pool "VB provider"
```

VMware vCenter Desktop Provider CLI Steps

- Create a new VMware vCenter desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-vc-create \
-p name=provider name,host=vCenter host,username=user name for host
```

The following example creates a VMware vCenter desktop provider.

```
example% /opt/SUNWvda/sbin/vda provider-vc-create \
-p name="VC provider",host=my.vc.com,username=Administrator
```

Microsoft Hyper-V Desktop Provider CLI Steps

1. Create a new Microsoft Hyper-V desktop provider name.

```
# /opt/SUNWvda/sbin/vda provider-hv-create -p name=provider name
```

2. Add at least one Microsoft Hyper-V host to the Microsoft Hyper-V desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-add-host \
-p host=Hyper-V host,username=user name for host provider name
```

3. Add at least one storage host to the Microsoft Hyper-V desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-add-storage \
-p host=storage host,username=user name for host,zfspool=pool name provider name
```

The following example creates a Microsoft Hyper-V desktop provider with two hosts and one storage.

```
example% /opt/SUNWvda/sbin/vda provider-hv-create -p name="HyV provider"

example% /opt/SUNWvda/sbin/vda provider-add-host \
-p host=my.first.hyv.com,port=443,username=root "HyV provider"

example% /opt/SUNWvda/sbin/vda provider-add-host \
-p host=my.second.hyv.com,port=443,username=root "HyV provider"

example% /opt/SUNWvda/sbin/vda provider-add-storage \
-p host=my.zfs.com,username=root,zfspool=vda_zfspool "HyV provider"
```

Microsoft Remote Desktop Services Provider CLI Steps

1. Create a desktop provider for RDS.

```
# /opt/SUNWvda/sbin/vda provider-ts-create -p name=provider name
```

2. Add at least one RDS host to the Microsoft RDS desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-add-host \
-p host=RDS host,username=user name for host provider name
```

The following example creates a Microsoft Remote Desktop provider.

```
example% /opt/SUNWvda/sbin/vda provider-ts-create -p name="RDS provider"

example% /opt/SUNWvda/sbin/vda provider-add-host \
-p host=my.rds.com,username=user name for host provider name
```

Generic Desktop Provider CLI Steps

- Create a Generic desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-pc-create
```

Sun Ray Kiosk Provider CLI Steps

- Create a Sun Ray Kiosk provider.

```
# /opt/SUNWvda/sbin/vda provider-kiosk-create -p name="provider name",session="session type"
```

See [Section 5.5, “About Sun Ray Kiosk Session Providers”](#) for information about using kiosk session types with Oracle VDI.

The following example creates a Sun Ray Kiosk Session provider for VMWare View Manager sessions.

```
example% /opt/SUNWvda/sbin/vda provider-kiosk-create \  
-p name="VMWare View Manager Kiosk Provider",session=vdm
```

Chapter 6. Preparing Desktops

Table of Contents

6.1. About Pools	84
6.1.1. How to Create Desktop Pools	84
6.1.2. How to Configure Networks Per Pool	85
6.1.3. How to Configure RDP Options Per Pool	86
6.1.4. How to Enable USB Redirection	89
6.1.5. How to Configure Smart Card Removal	90
6.1.6. How to Configure Kiosk Settings (Sun Ray Kiosk Provider)	91
6.1.7. Choosing Between VRDP and MS-RDP	91
6.2. About Desktops	94
6.2.1. Supported Desktop Operating Systems	95
6.2.2. Available Actions for Desktops	95
6.3. About Templates and Revisions	99
6.3.1. Available Actions for Templates	100
6.3.2. Available Actions for Revisions	102
6.4. About Desktop and Virtual Machine States	103
6.4.1. Virtual Machine States	103
6.4.2. Desktop States	104
6.5. Creating Desktop Images	105
6.5.1. How to Create Virtual Machines (Oracle VDI Hypervisor)	105
6.5.2. How to Create Virtual Machines (VMware vCenter)	107
6.5.3. How to Create Virtual Machines (Microsoft Hyper-V)	109
6.6. Importing Desktops	111
6.6.1. How to Import Desktops (Oracle VDI Hypervisor)	111
6.6.2. How to Import Desktops (VMware vCenter)	112
6.6.3. How to Import Desktops (Microsoft Hyper-V)	113
6.6.4. How to Import Individual Windows PCs	114
6.6.5. About Template Management	115
6.7. Cloning Desktops	116
6.7.1. How to Clone Desktops (Oracle VDI Hypervisor)	116
6.7.2. How to Clone Desktops (VMware vCenter)	117
6.7.3. How to Enable VMware Linked Cloning	118
6.7.4. How to Clone Desktops (Microsoft Hyper-V)	119
6.7.5. About Clone Customization	119
6.7.6. How to Debug Fast Preparation Problems	120
6.7.7. How to Enable Oracle VDI Fast Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)	120
6.7.8. How to Enable System Preparation for Windows Templates (Oracle VDI Hypervisor and Microsoft Hyper-V)	121
6.7.9. About Personal Hard Drives	124
6.7.10. Clone and Recycle Job Management	124
6.8. Assigning Users to Desktops	125
6.8.1. How to Assign Users to Pools or Desktops	125
6.8.2. How to Create Custom Groups and Custom Group Filters	126
6.8.3. How to Assign Tokens to Users	126
6.8.4. How to Assign Tokens to Desktops or Pools	127
6.8.5. How to Create Bulks of Tokens	129
6.8.6. How to Search for Desktops	129

6.1. About Pools

6.1.1. How to Create Desktop Pools

Oracle VDI 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.



Caution

When you change 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 inaccessible) NAT IP.



Note

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

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a company.
3. In the **Pools** table, click **New**.

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.



Note

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

CLI Steps

- Create a pool.

```
# /opt/SUNWvda/sbin/vda pool-create -p name=pool name,provider=desktop provider name
```


- Example - Creates a pool for an Oracle VDI desktop provider.

```
example% /opt/SUNWvda/sbin/vda pool-create \
-p name="Templates",provider="VB provider",assignment-type=personal
```

- Example - Creates a pool for a VMware vCenter desktop provider and specifies a template to fill the pool from.

```
example% /opt/SUNWvda/sbin/vda provider-list-templates "VC provider"
NAME ID PATH
XP-Template vm-134 [Datacenters, ADatacenter, vm]
XPClone vm-629 [Datacenters, ADatacenter, vm]
example% /opt/SUNWvda/sbin/vda pool-create \
-p name="VC pool",provider="VC provider",template=vm-134,preferred-size=30,\
free-size=5,max-size=35,power-state=on,assignment-type=flexible,\
recycle-policy=reuse,idle-timeout=2
```

6.1.2. How to Configure Networks Per Pool

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 VDI 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 Oracle 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, Oracle 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, Oracle 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 Oracle 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, Oracle 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, Oracle 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, Oracle 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.



Note

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

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to 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.



Note

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.



Note

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.

6.1.3. 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.

The options that can actually be used for a virtual desktop depend on the RDP protocol selected for the pool, the desktop operating system, and the configuration of the virtual desktop itself. For more information, see:

- [Section 6.1.7, “Choosing Between VRDP and MS-RDP”](#)
- [Section 7.1, “About Desktop Access Methods”](#)
- [Section 6.2.1, “Supported Desktop Operating Systems”](#)

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the Settings tab.
4. In the Sun Ray section, click the Edit Sun Ray RDP Settings link.
5. Enable the desired RDP settings and click Save.

6. Click Back, and select the Use Customized Settings option in the Sun Ray section.

7. Click Save.

6.1.3.1. Available RDP Options

The Sun Ray Windows connector ([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 Oracle VDI Sun Ray settings compare to the Sun Ray Windows connector [uttsc](#) settings, refer to section [Appendix B, Defaults for the Software Bundled With Oracle VDI](#).

Name	Description	Default Value
General		
Locale	Use this setting to identify the locale used for users' desktop sessions. Any valid locale identifier 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
Hotdesking	Use this setting to configure the disconnection and reconnection behavior for RDP sessions when hotdesking occurs.	If Device Client Access License Mode is configured, RDP sessions are disconnected and reconnected. If Device Client Access License Mode is not configured, RDP sessions are not disconnected.
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		
Color Depth	Use this setting to specify the preferred color depth for users' desktop sessions. Valid values for this setting are 8, 15, 16, 24 and 32. Note: Color depth may be limited by configuration of the desktop to which a user connects. In such cases the available color depths of the desktop will take priority over the color depth configured for the pool containing the desktop.	32
Theming	Use this setting to enable or disable theming for users' desktop sessions.	Disabled

Name	Description	Default Value
	Note: Disabling this setting can improve display performance.	
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 an Sun Ray Client to users' desktop sessions.	Disabled
USB	Use this setting to enable or disable USB redirection from an Sun Ray Client 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 <code>comport=device</code> where <code>device</code> identifies the serial device to be redirected and <code>comport</code> identifies the port (on the users' desktops) that <code>device</code> should be redirected to.	No serial devices are redirected by default.

Name	Description	Default Value
Paths	<p>Use this setting to identify paths (available on an Oracle VDI host) which should be redirected to drives on users' desktop sessions.</p> <p>Valid values for this setting are specified using the format <i>drive name=path</i> where <i>path</i> identifies the path to be redirected and <i>drive name</i> identifies the drive (on the users' desktops) that <i>path</i> should be redirected to.</p>	No paths are redirected by default.
Printers	<p>Use this setting to identify printer queues which should be redirected to users' desktop sessions.</p> <p>Valid values for this setting are specified using the format <i>printer=[driver]</i> where <i>printer</i> identifies the printer queue to be redirected and <i>driver</i> identifies a printer driver to be used for the printer on users' desktop sessions. If <i>driver</i> is omitted, a simple PostScript driver is used by default.</p>	No printer queues are redirected by default.

6.1.4. How to Enable USB Redirection

Before You Begin

1. Prepare your virtual machine template by installing the USB Redirector.

See *How to Install the Windows Connector Components on a Windows System* in the [Sun Ray Software 5.2 Installation and Configuration Guide](#) for details.

2. Add additional USB drivers for virtual machines created in VMware vCenter or Microsoft Hyper-V.

This step is not necessary for Oracle VM VirtualBox virtual machines. See *Windows Connector* in the [Sun Ray Software 5.2 Installation and Configuration Guide](#) for details.

Steps

1. Import the prepared virtual machine as a template into the Oracle VDI host.

Refer to the following:

- [Section 6.6.1, “How to Import Desktops \(Oracle VDI Hypervisor\)”](#)
- [Section 6.6.3, “How to Import Desktops \(Microsoft Hyper-V\)”](#)
- [Section 6.6.2, “How to Import Desktops \(VMware vCenter\)”](#)

2. In Oracle VDI Manager, go to **Pools**.
3. Select a pool.
4. Go to the Settings tab.
5. Select Edit RDP Settings. Save settings with USB enabled.
6. Select Use Customized RDP Settings, and save again.
7. (Optional) Clone some virtual machines with Sysprep enabled.

8. Once the virtual machine is available, obtain a session for any user, and log into the virtual machine.
9. 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.

6.1.5. 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 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 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 Oracle VDI Manager or the 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. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the Settings tab.
4. 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 VDI 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.
5. 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.
6. Click **Save**.

CLI Steps

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

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

2. 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
```

In the following example, the desktop action that should be performed after a smart card has been out of a thin client for 30 seconds is configured.

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

6.1.6. How to Configure Kiosk Settings (Sun Ray Kiosk Provider)

You can configure kiosk settings by defining the arguments to be passed to a Sun Ray Kiosk Mode session. Kiosk settings are configurable per pool and are available only for Sun Ray Kiosk pools. Kiosk session arguments are provided as text using a command line syntax. The settings can be configured using Oracle VDI Manager or the CLI.

Each kiosk session type defines what options and arguments it supports. The specified arguments override any default arguments defined by the kiosk session type. For more information, see *Kiosk Mode* in the [Sun Ray Software 5.2 Administration Guide](#) and the documentation for the specific kiosk session type.

See [Section 5.5, "About Sun Ray Kiosk Session Providers"](#) for more details about Sun Ray kiosk sessions.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the Settings tab.
4. In the Kiosk Settings field, type the arguments to pass to the kiosk session.
5. Click Save.

CLI Steps

- Configure the kiosk settings for the pool.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p kiosk-settings="kiosk session arguments" "pool name"
```

In the following example, settings are configured for a Sun Ray VMware View connector kiosk session.

```
# /opt/SUNWvda/sbin/vda pool-setprops \
-p kiosk-settings="-s myvdmserver.domain -https -- -E theming" "VDM-Pool"
```

6.1.7. Choosing Between VRDP and MS-RDP

Oracle VDI uses the Remote Desktop Protocol (RDP) for transmitting data to and from virtual desktops. Oracle VDI supports two different types of RDP, Oracle VM VirtualBox (VRDP) and Microsoft RDP (MS-RDP).

VRDP enables Oracle VDI to connect to virtual desktops at the machine level. This characteristic enables users to watch a virtual machine boot in the same way as a real computer, and desktop sessions appear to start faster. With VRDP, you can also choose between network address translation (NAT) networking or host networking (bridged networking). NAT networking is the simplest way of accessing an external network from a virtual machine, and usually it does not require any configuration on the host network or virtual machine.

With MS-RDP, Oracle VDI connects at the operating system level. Users are not able to watch the virtual machine boot, and the desktop sessions appear to start slower because you have to wait for the virtual machine to boot and be ready to accept RDP connections.

For virtual desktops hosted by Oracle VDI desktop providers, you can use either VRDP or MS-RDP. You select the required protocol and networking method in the network settings for the pool, see [Section 6.1.2](#),

[“How to Configure Networks Per Pool”](#). By default, pools are configured to use VRDP and NAT networking. To use MS-RDP, you must select host networking.

For all other desktop providers, MS-RDP is used.

The following table contains a list of features that are supported by VRDP and MS-RDP.

Feature	Description	VRDP	MS-RDP
Audio recording (input audio)	Enables recording from client devices to virtual desktops.	✓	✓
Audio redirection	Enables audio content on virtual desktops to be played on client devices.	✓	✓
Auto-logon	Enables users to be logged in automatically to remote desktops.	✓	✓
Clipboard redirection	Enables copy and paste functionality for text between client devices and virtual desktops.	✓	✓
COM port mapping	Enable access to serial devices connected to client devices.	✗	✓
Compression	Enables the bulk compression of data sent to and from the virtual desktops.	✗	✓
Drive redirection (client drive mapping)	Enables access to drives on the client devices.	✓ (USB only)	✓
Multi-desktop	Enables multiple virtual desktops to be displayed if multiple monitors are attached to client devices.	✓	✓
Multi-monitor	Enables the use of multiple monitors attached to client devices. One desktop session can be displayed on multiple monitors, or multiple desktop sessions on multiple monitors.	✓	✓ (RDP 7 only)
Network security (encryption level)	Enables the encrypted transmission of data to and from virtual desktops, optionally with host verification.	✓	✓
Session directory	Enables automatic reconnection to existing virtual desktop sessions.	✗	✓
Smart card device redirection	Enables access to smart card devices connected to client devices.	✓ (USB only)	✓
Time zone redirection	Enables the time in the virtual desktop to be adjusted to match the time zone of the client device.	✗	✓
USB device redirection	Enables access to USB devices connected to client devices.	✓	✓
Video acceleration	Enables enhancement to improve the performance of video streams and Adobe Flash content.	✓	✓

Feature	Description	VRDP	MS-RDP
Windows printer mapping (client printing)	Enables printing to printers attached to client devices, or printing to local or network printers attached to the virtual desktop or Sun Ray Software server.	✓ (local client USB printers only)	✓

The list of features in the table above is only a statement of the capabilities of each of the protocols. The features that can actually be used for a virtual desktop depend on the method used to access the desktop (the client), and the configuration of the virtual desktop itself. For more information, see the [Section 7.1, “About Desktop Access Methods”](#) and the following notes.

For VRDP, human interface devices (HID) such as keyboards and mice do not rely on the use of USB redirection.

For detailed information of the features listed in the above table, and information on using MS-RDP and the Sun Ray Windows connector, see the chapter “*Windows Connector*” in the [Sun Ray Software 5.2 Administration Guide](#).

For detailed information on VRDP, see the chapter “*Remote Virtual Machines*” in the [Oracle VM VirtualBox documentation](#).

Desktop Performance Settings and VRDP

Most RDP client programs have settings that can be used to enhance the performance of remote desktops. For example, for Sun Ray Clients, these settings can be configured for a pool, see [Section 6.1.3, “How to Configure RDP Options Per Pool”](#). The performance settings control things such as the color depth, the mouse shadow, and window and menu animations. However, if the VRDP protocol is used to connect to desktops, these settings have no effect, because VRDP connects at the machine level rather than the operating system level.

Auto-Logon and VRDP

To use automated logons for Windows desktops hosted by an Oracle VDI Hypervisor, the Oracle VM VirtualBox Windows Guest Addition module must be installed in the template or desktop. The Guest Additions must be installed from the command line with the `/with_autologon` switch.

Audio Recording (Input Audio) and MS-RDP

To configure support for audio recording (input audio) from a Sun Ray Client when the MS-RDP protocol is used to connect to a virtual desktop, you must install the audio input component of the Sun Ray Windows connector in the template or desktop. This component is supported on Windows XP and Windows Server 2003 only.

See *How to Install the Windows Connector Components on a Windows System* in the [Sun Ray Software 5.2 Installation and Configuration Guide](#) for details.

Audio input is disabled by default. You enable it by using the `-r soundin:[low|medium|high|off]` option of the `uttsc` command. To implement this option, you have to adapt the Oracle VDI kiosk session. See [Section 7.2.1, “About the Oracle VDI Sun Ray Kiosk Session”](#) for details.

Multi-Monitor

For multi-monitor support, Oracle VDI runs a separate instance of the Sun Ray Windows connector for each monitor connection.

Oracle VDI provides additional security for VRDP connections by setting a one-time password. Without the correct user name and one-time password, an RDP client fails to connect.

Not all editions of Windows 7 include multi-monitor support, see the [Microsoft Remote Desktop Connection FAQ](#) for details.

USB Redirection and MS-RDP

To configure support for USB redirection from a Sun Ray Client when the MS-RDP protocol is used to connect to a virtual desktop, you must install the USB redirection component of the Sun Ray Windows connector in the template or desktop. See [Section 6.1.4, "How to Enable USB Redirection"](#) for details.

Video Acceleration and VRDP

Oracle VM VirtualBox has a Video Redirection feature for VRDP. Video streams in a virtual machine are detected by the VRDP server automatically as frequently updated rectangular areas. Video frames are compressed using the Motion JPEG (M-JPEG) format, allowing a higher compression rate than standard RDP bitmap compression methods. The Video Redirection feature works without having to install additional software in the guest. It is not possible to turn off this feature or to change the compression rate.

The Video Redirection feature is supported for any supported desktop that uses VRDP and accessed from a Sun Ray Client, or a client that supports RDP version 7. On Sun Ray Clients, the M-JPEG video streams are delivered through the SunFlash channel.

Video Acceleration and MS-RDP

Video Acceleration is supported for connections that use RDP version 7.

To configure support for video acceleration from a Sun Ray Client when the MS-RDP protocol is used to connect to a virtual desktop, you must install the following components of the Sun Ray Windows connector in the template or desktop:

- Multimedia redirection: This component provides enhanced performance for Windows Media Player.
- Adobe Flash acceleration: This component provides enhanced playback capabilities for Adobe Flash content.
- Audio/video synchronization: This component provides enhanced audio and video synchronization for multimedia content

These components are supported on Windows XP and Windows Server 2003 only.

For detailed information on how to install the components, see *How to Install the Windows Connector Components on a Windows System* in the [Sun Ray Software 5.2 Installation and Configuration Guide](#) for details.

For detailed information about the Sun Ray Windows connector components, see the chapter "Windows Connector" in the [Sun Ray Software 5.2 Administration Guide](#).

6.2. 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 VDI manages desktops on any of the following virtualization 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 VDI 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 [Section 6.3, “About Templates and Revisions”](#) section.

6.2.1. Supported Desktop Operating Systems

The following table shows the desktop operating systems that are supported for each desktop provider type. Pay particular attention to the notes that follow this table.

Desktop Operating System	Oracle VDI Hypervisor	VMware vCenter	Microsoft Hyper-V
Windows 7 (32-bit and 64-bit)	✓	✓	✓
Windows Vista Enterprise	✓	✓	✓
Windows XP SP2 and SP3 (32-bit and 64-bit)	✓	✓	✓
Windows 2000 SP4	✓ (VRDP only)		
Oracle Linux 5.6	✓ (VRDP only)		
Oracle Solaris 10, at least release 10/09	✓ (VRDP only)		
Ubuntu 11.04 (Natty Narwhal)	✓ (VRDP only)		
Ubuntu 10.04 (Lucid Lynx)	✓ (VRDP only)		

Not all editions of Windows 7 include support for remote desktop connections, see the [Microsoft Remote Desktop Connection FAQ](#) for details.

The supported desktops for Microsoft Remote Desktop provider are described in [Section 5.2.2, “Microsoft Remote Desktop Services”](#).

The features that can be used with a virtual desktop depend on the RDP protocol selected for the pool and the method used to access Oracle VDI. For more information, see the following:

- [Section 6.1.7, “Choosing Between VRDP and MS-RDP”](#)
- [Section 7.1, “About Desktop Access Methods”](#)

6.2.2. Available Actions for Desktops

Not all actions are available for all platforms. VMware has its own management tool VMware vCenter, and Oracle VDI 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 Oracle VDI. After that the desktop can be assigned to any user. Oracle VM VirtualBox and Microsoft Hyper-	Desktop Tab → Import (button)	pool-vb-import pool-vb-import-unmanaged pool-vc-import	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V • VMware • Generic

Action	Details	Location in Oracle VDI Manager	vda Subcommand	Desktop Provider
	<p>V hosted machines can be imported from a shared folder. In addition, virtual machines can be directly imported from an 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 Oracle VDI.</p> <p>For more details see:</p> <ul style="list-style-type: none"> • Section 6.6.1, "How to Import Desktops (Oracle VDI Hypervisor)" • Section 6.6.3, "How to Import Desktops (Microsoft Hyper-V)" • Section 6.6.2, "How to Import Desktops (VMware vCenter)" 		pool-hv-import	
Duplicate Desktops	Creates an identical clone of any desktop.	Desktop Tab → Duplicate (in Menu)	desktop-duplicate	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	Desktop Tab → Export (in Menu)	desktop-export	<ul style="list-style-type: none"> • Oracle VDI

Action	Details	Location in Oracle VDI Manager	vda Subcommand	Desktop Provider
	can then be stored and used outside 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 database.	Desktop Tab → Delete Desktop (in Menu)	desktop-delete	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)		<ul style="list-style-type: none"> • 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	Desktop Tab → Assign (button)	user-personaldesktop	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V • VMware

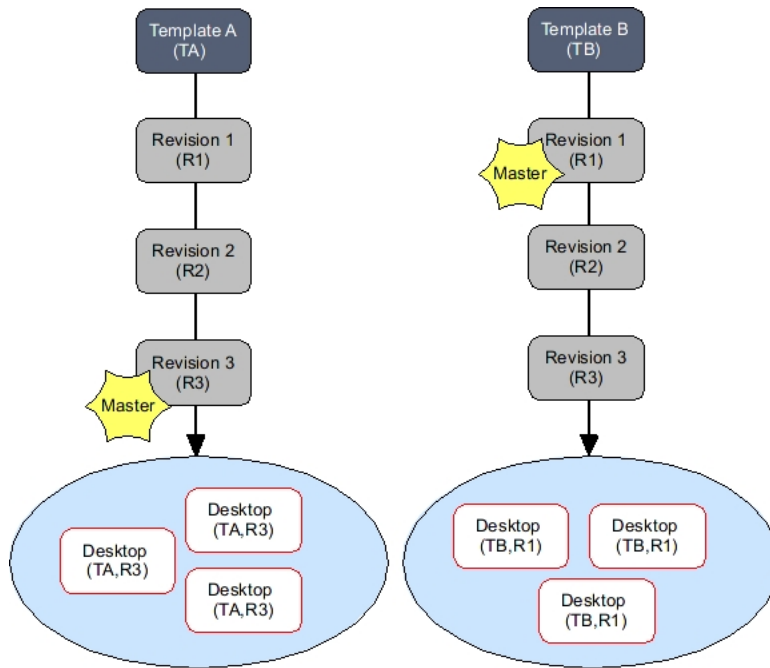
Action	Details	Location in Oracle VDI Manager	vda Subcommand	Desktop Provider
	as their personal desktop.			<ul style="list-style-type: none"> • Generic
Remove User	Breaks the persistent relation between user and desktop.	Desktop Tab → Remove User (in Menu)	<code>user-unassign</code>	<ul style="list-style-type: none"> • 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)	<code>desktop-logoff</code>	<ul style="list-style-type: none"> • 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)	<code>desktop-disconnect</code>	<ul style="list-style-type: none"> • 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)	<code>desktop-start</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V • VMware
Shut Down Desktop	Sends an ACPI shutdown signal to the desktop.	Desktop Tab → Shut Down (in Menu)	<code>desktop-stop</code> (without ' <code>-p</code> ' option)	<ul style="list-style-type: none"> • 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)	<code>desktop-restart</code>	<ul style="list-style-type: none"> • 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,	Desktop Tab → Power Off (in Menu)	<code>desktop-stop -p</code> (with ' <code>-p</code> ' option)	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V • VMware

Action	Details	Location in Oracle VDI Manager	vda Subcommand	Desktop Provider
	the desktop is only powered off.			
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	<ul style="list-style-type: none"> • 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)		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V
Activate Desktop	In some error situations, Oracle VDI 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	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V

6.3. About Templates and Revisions

The term **template** refers to a special desktop that is used for cloning. For more about desktops, refer to the [Section 6.2, "About Desktops"](#) section. 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 VDI offers template management for Oracle VDI and Microsoft Hyper-V desktop pools. VMware Infrastructure has its own template management and therefore Oracle VDI offers access to the list of available templates in VMware vCenter.

Oracle VDI 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.

Figure 6.1. Templates and Revisions

6.3.1. Available Actions for Templates

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

Action	Details	Location in Oracle VDI Manager	<code>vda</code> Subcommand	Desktop Provider
Import Template	Imports a virtual machine into Oracle VDI, 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)	<code>pool-vb-import</code> <code>pool-vb-import-unmanaged</code> <code>pool-vc-import</code> <code>pool-hv-import</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V
Open Console	Opens a new window to access the template directly from the browser.	Template Tab → Open Console (button)		<ul style="list-style-type: none"> • Oracle VDI
Create Revision	Saves the current state of the template as a new revision.	Template Tab → Create Revision (button)	<code>revision-create</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V
Rename	Renames the template or revision.	Template Tab → Rename (in Menu)	<code>template-setprops</code>	<ul style="list-style-type: none"> • 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)	<code>template-desktop</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V

Action	Details	Location in Oracle VDI Manager	vda Subcommand	Desktop Provider
Export Template	Exports the selected template to disk, consisting of an XML file for the properties of the virtual machine and a <code>.vdi</code> file for the content of the template's hard drive. The exported desktop can then be stored and used outside Oracle VDI.	Template Tab → Export (in Menu)	<code>template-export</code>	<ul style="list-style-type: none"> • Oracle VDI
Start Template	Starts the desktop in order to apply changes to the template.	Template Tab → Start (in Menu)	<code>template-start</code>	<ul style="list-style-type: none"> • 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)	<code>template-restart</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V
Shut Down Template	Sends an ACPI shutdown signal to the template.	Template Tab → Shut Down (in Menu)	<code>template-stop</code> (without <code>'-p'</code> option)	
Power Off Template	Immediately powers-off the template and unregisters it from the virtualization host.	Template Tab → Power Off (in Menu)	<code>template-stop -p</code> (with <code>'-p'</code> option)	<ul style="list-style-type: none"> • 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)	<code>template-mount-iso</code> <code>template-unmount-iso</code>	<ul style="list-style-type: none"> • 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)	<code>pool-setprops</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V
Revert Template	Reverts the template to the most recent revision.	Template Tab → Revert (in Menu)	<code>template-revert</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V
Delete Template	Delete the template and all	Template Tab → Delete (in Menu)	<code>template-delete</code>	<ul style="list-style-type: none"> • Oracle VDI

Action	Details	Location in Oracle VDI Manager	vda Subcommand	Desktop Provider
	the corresponding revisions of the template.			<ul style="list-style-type: none"> Hyper-V

6.3.2. 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.	Template Tab → Make Master (button)	<code>revision-setprops</code>	<ul style="list-style-type: none"> Oracle VDI Hyper-V
Rename Revision	Renames the revision.	Template Tab → Rename (in Menu)	<code>revision-setprops</code>	<ul style="list-style-type: none"> 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.	Template Tab → Copy to Template (in Menu)	<code>template-create</code>	<ul style="list-style-type: none"> Oracle VDI Hyper-V
Copy Revision to Desktop	Creates a new independent desktop in the same pool.	Template Tab → Copy to Desktop (in Menu)	<code>revision-desktop</code>	<ul style="list-style-type: none"> Oracle VDI Hyper-V
Clone Revision	Creates a desktop based on the selected revision in the same pool.	Template Tab → Clone Desktop (in Menu)	<code>revision-clone</code>	<ul style="list-style-type: none"> 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 <code>.vdi</code> file for the content of the desktop's hard drive. The exported desktop can then be stored and used outside Oracle VDI.	Template Tab → Export (in Menu)	<code>revision-export</code>	<ul style="list-style-type: none"> 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.	Template Tab → System Preparation (in Menu)	<code>revision-sysprep</code>	<ul style="list-style-type: none"> Oracle VDI Hyper-V

Action	Details	Location in Oracle VDI Manager	vda Subcommand	Virtualization Platform
Apply for Cloning	Selects a pool that should use a specific revision for cloning. Otherwise the master revision will be used.	Template Tab → Apply for Cloning (in Menu)	<code>pool-setprops</code>	<ul style="list-style-type: none"> • 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 database.	Template Tab → Delete (in Menu)	<code>revision-delete</code>	<ul style="list-style-type: none"> • Oracle VDI • Hyper-V

6.4. About Desktop and Virtual Machine States

In Oracle VDI, 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 VDI provides advanced management and lifecycle features which allow the effective management of thousands of desktops. Desktops transition through states defined by settings in Oracle VDI.

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.

6.4.1. Virtual Machine States

Virtual machine states are defined by the virtualization platform.

- **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 Oracle VDI Manager. A running virtual machine is connected directly to the storage.

- **Powered Off**

Powered off virtual machines reside in two places in the Oracle VDI environment, the database and the storage. The Oracle VDI 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 Oracle VDI to select the best suited host on every start of a virtual machine. This setup helps ensure a distribution of virtual machines across the available Oracle VM VirtualBox or Microsoft Hyper-V hosts minimizing resource usage on each.

- **Suspended**

Suspended virtual machines have been suspended by the hypervisor.

- **Paused, Aborted, or Stuck**

These machine states are specific to Oracle VM VirtualBox.

- **Unknown**

This state typically indicates that either a VMware vCenter server cannot be contacted to retrieve the state information, or an Oracle VM VirtualBox host returns null.

- **Active or Disconnected**

These machine states apply to Microsoft Remote Desktops only. Oracle VDI does not control the machine state, just the connection to the desktop.

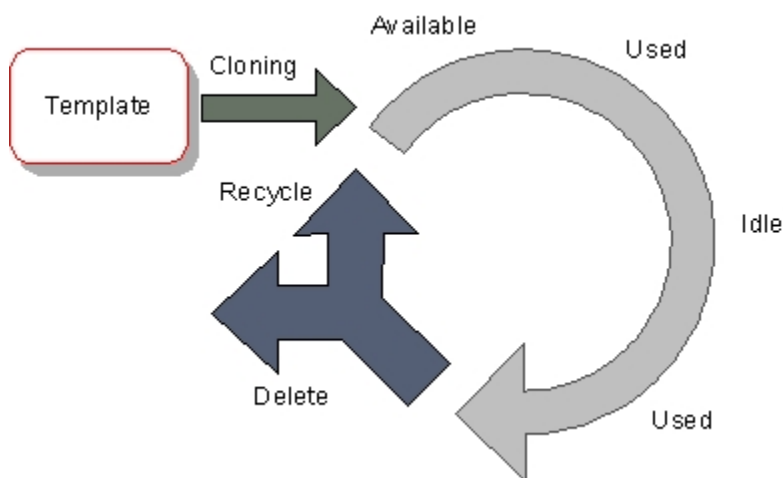
6.4.2. Desktop States

The desktop states are used to accomplish the following:

- Implement the desktop lifecycle.
- Synchronize Oracle VDI 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.

Figure 6.2. 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 Oracle VDI. 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 Oracle VDI 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.

6.5. Creating Desktop Images

This section describes how to create the virtual machines that are to be used as desktop images.

After creating the virtual machine and installing the desktop operating system, it is best to optimize the desktop operating system for performance in a virtual machine. The guidelines in this section outline the desktop image settings that maximize desktop performance in Oracle VDI. These are not requirements, they are suggestions for better performance.

6.5.1. How to Create Virtual Machines (Oracle VDI Hypervisor)

Oracle VDI 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 Oracle VDI 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 release as the Oracle VDI Hypervisor.

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.

- For Windows Vista and Windows 7, a minimum of 1024 MB RAM and 5723 MB hard disk are recommended.
- For Windows 2000 and Windows XP, a 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 documentation](#).

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 provides a Windows Guest Addition module for automated logons on Windows XP, Windows Vista, and Windows 7 guests. 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.

For more information, see:

- [Section 8.6.2, “Optimizing Windows 7 Desktop Images”](#)
- [Section 8.6.3, “Optimizing Windows Vista Desktop Images”](#)
- [Section 8.6.4, “Optimizing Windows XP Desktop Images”](#)
- [Section 8.6.5, “Optimizing Desktop Images for Other Operating Systems”](#)

6.5.2. How to Create Virtual Machines (VMware vCenter)

Oracle VDI 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 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. 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.
 - For Windows Vista and Windows 7, a minimum of 1024 MB RAM and 5723 MB hard disk are recommended.
 - For Windows 2000 and Windows XP, a 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 <http://www.vmware.com/pdf/>

[vi3_35/esx_3/r35u2/vi3_35_25_u2_admin_guide.pdf](#) 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 Oracle VDI Tools. Oracle VDI has a tools component that notifies the Oracle VDI service when a desktop is in use and handles RDP connections when the guest OS initiates standby. The Oracle 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 Oracle 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 Oracle VDI archive.

The [vda-tools-x86.msi](#) and [vda-tools-x64.msi](#) are located in the `./image/vda_<Oracle-VDI-release>/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 Oracle 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.

For more information, see:

- [Section 8.6.2, "Optimizing Windows 7 Desktop Images"](#)
- [Section 8.6.3, "Optimizing Windows Vista Desktop Images"](#)
- [Section 8.6.4, "Optimizing Windows XP Desktop Images"](#)
- [Section 8.6.5, "Optimizing Desktop Images for Other Operating Systems"](#)

6. Convert a virtual machine into a template.

You can clone additional virtual machines manually, or Oracle VDI 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 VDI.
- f. After completing the wizard and saving your customization specification, close the Customization Specification Manager.

Refer to *VMware Basic System Administration*; see: http://www.vmware.com/pdf/vi3_35/esx_3/r35u2/vi3_35_25_u2_admin_guide.pdf for more information about Custom Specifications.

6.5.3. 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; see: <http://www.windowsreference.com/hyper-v/hyper-v-how-to-create-a-new-virtual-machine/>.

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.
 - a. For Windows Vista and Windows 7, a minimum of 1024 MB RAM and 5723 MB hard disk are recommended.
 - b. For Windows 2000 and Windows XP, a 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 Oracle VDI service when a desktop is in use and handles RDP connections when the guest OS initiates Standby. The Oracle 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 Oracle VDI archive.

The installer is located in the `vda_<Oracle-VDI-release>/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 Oracle 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.

For more information, see:

- [Section 8.6.2, “Optimizing Windows 7 Desktop Images”](#)
- [Section 8.6.3, “Optimizing Windows Vista Desktop Images”](#)
- [Section 8.6.4, “Optimizing Windows XP Desktop Images”](#)
- [Section 8.6.5, “Optimizing Desktop Images for Other Operating Systems”](#)

6.6. Importing Desktops

6.6.1. 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 database.



Note

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 database. Refer to the [Section 6.5.1, “How to Create Virtual Machines \(Oracle VDI Hypervisor\)”](#) section for detailed information.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select 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 host in `/var/tmp`, define the corresponding XML and Oracle 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.



Note

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

```
# scp path to file root@Oracle 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/
```

CLI Steps

- Import a desktop from the Oracle VDI host into the Oracle VDI database.

```
# /opt/SUNWvda/sbin/vda pool-vb-import -p vdi-image=virtual machine name.vdi,\
xml-configuration=virtual machine name.xml pool name
```

Example - Importing an Oracle VM VirtualBox desktop

```
example% /opt/SUNWvda/sbin/vda pool-vb-import \
-p vdi-image=UbuntuDE.vdi,xml-configuration=UbuntuDE.xml "Sales - EMEA"
```

- Import a desktop from the Oracle VM VirtualBox host into the Oracle VDI database.

1. List all unmanaged desktops for a specified desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-list-unmanaged desktop provider name
```

Example - Listing and importing unmanaged Oracle VM VirtualBox desktops

```
example% /opt/SUNWvda/sbin/vda provider-list-unmanaged "VB provider"
HOST NAME ID
my.vb.com UbuntuDE 35
my.vb2.com UbuntuEN 36
example% /opt/SUNWvda/sbin/vda pool-vb-import-unmanaged -d 35 "Sales - EMEA"
```

2. Import a desktop into the Oracle VDI database.

```
# /opt/SUNWvda/sbin/vda pool-vb-import-unmanaged -d desktop ID pool name
```

6.6.2. 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 Oracle VDI 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 Oracle VDI. Refer to the [Section 6.5.2, "How to Create Virtual Machines \(VMware vCenter\)"](#) section for detailed information.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to 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** database.



Note

Desktops that are already imported into Oracle VDI 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).

CLI Steps

1. List all unmanaged desktops for a specified desktop provider.

```
# /opt/SUNWvda/sbin/vda provider-list-unmanaged desktop provider name
```

2. Import a desktop in to the Oracle VDI database.

```
# /opt/SUNWvda/sbin/vda pool-vc-import -d desktop IDpool name
```

Example - Listing and importing unmanaged vCenter desktops

```
# /opt/SUNWvda/sbin/vda provider-list-unmanaged "VC provider"
HOST NAME ID
my.vc.com WindowsXPde vm-134
my.vc2.com WindowsXPen vm-629
# /opt/SUNWvda/sbin/vda pool-vc-import -d vm-134 "Support - EMEA"
```

6.6.3. 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 database.



Note

Importing snapshots of virtual machines is **not** supported.

Before You Begin

A virtual machine must be created in Microsoft Hyper-V and exported, before it can be imported into the Oracle VDI database. Refer to the [Section 6.5.3, “How to Create Virtual Machines \(Microsoft Hyper-V\)”](#) section for detailed information. To export the virtual machine from the Hyper-V server:

1. In the Hyper-V management console, select the Hyper-V virtual machine.
2. 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 Oracle VDI host or to a shared directory on a remote server (the shared directory must be accessible to the Oracle VDI host).

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the **Desktops** tab, and click **Import**. An import dialog will be displayed.
4. In the Server property, select the server you copied the Microsoft Hyper-V desktop directories to (if you copied them to your Oracle VDI 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).
5. In the **Path** property, enter the path to the directory that contains the Microsoft Hyper-V desktop directories.
6. 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.

CLI Steps

- Import a Hyper-V desktop into the Oracle VDI database.

```
# /opt/SUNWvda/sbin/vda pool-hv-import \  
-p export-directory=path to export directory pool name
```

Example - Importing a Hyper-V desktop into the Oracle VDI database

```
example% /opt/SUNWvda/sbin/vda pool-hv-import \  
-p export-directory=/data/virtual-machines/xp-template hvpool
```

6.6.4. How to Import Individual Windows PCs

Individual Windows PCs can be imported and managed with 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. In Oracle VDI Manager, go to **Desktop Providers**.
2. In the **Desktop Providers** table, click **New**.

Create a Generic desktop provider.

3. Go to **Pools**.
4. In the **Pools** table, click **New**.
Choose the Generic desktop provider to host the pool.
5. Select the newly created pool from the **Pools** table.
6. Go to the **Desktop** tab and click **Import**.

6.6.5. 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 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.

6.6.5.1. How to Modify a Template in Oracle VDI Manager

Template modification from 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 [Section 6.3, “About Templates and Revisions”](#) section.

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 Oracle VDI Manager. Once you have created and imported the virtual machine, you can start it from Oracle VDI Manager and carry out all the necessary preparation steps from there. For more information, see [Section 6.5.1, “How to Create Virtual Machines \(Oracle VDI Hypervisor\)”](#) or [Section 6.5.3, “How to Create Virtual Machines \(Microsoft Hyper-V\)”](#).

Oracle VDI Manager Steps

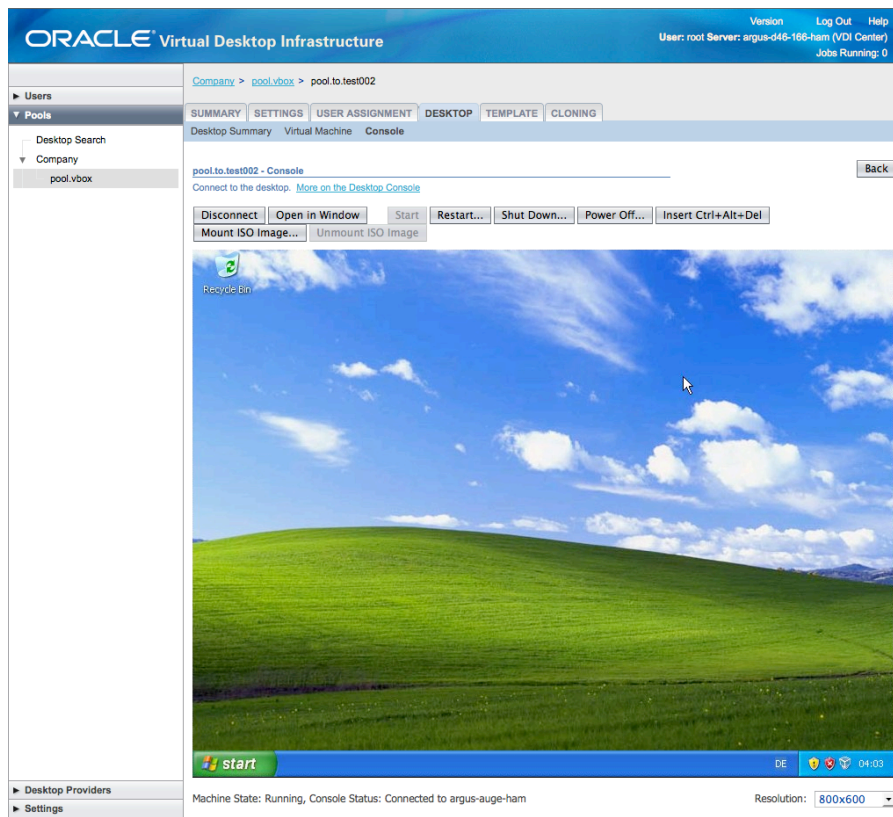
1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the Template tab.
4. Click the Import Template button to import the virtual machine you just created in the hypervisor interface.

The virtual machine will be saved as Revision 1 as soon as it is imported.

5. 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 Oracle VDI Manager.
6. 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.

Figure 6.3. Interactive Adobe Flash Console



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

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

6.7. Cloning Desktops

6.7.1. 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 [Section 6.6.1, "How to Import Desktops \(Oracle VDI Hypervisor\)"](#) section for detailed information.

Oracle VDI Manager Steps

- To enable cloning in an existing pool:
 1. In Oracle VDI Manager, go to **Pools**.

2. Select a pool.
 3. Go to the **Cloning** tab.
 4. 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.
 5. To start cloning, check **Enable Automatic Cloning** and click **Save**.
- To enable cloning in the **New Pool** wizard during pool creation:
 1. Choose the desktop template and select **Enable Automatic Cloning**.
 2. 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 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

- 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
```

6.7.2. 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.

Oracle VDI includes support for VMware linked clones. For details of how to enable the use of linked clones in Oracle VDI, see [Section 6.7.3, "How to Enable VMware Linked Cloning"](#).

Before You Begin

A virtual machine must be imported before a template can be cloned. Refer to the [Section 6.6.2, "How to Import Desktops \(VMware vCenter\)"](#) section for detailed information.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Go to the **Resources** tab.
3. Select your preferred storage for newly cloned virtual machines.

By default, all available storage may be used. For each clone, Oracle VDI will select the storage with the most available disk space.

4. Go to 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 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

- Start automatic cloning in a pool.

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

6.7.3. How to Enable VMware Linked Cloning

Oracle VDI includes support for VMware linked clones. VMware linked cloning enables multiple virtual machines to share virtual disks with a parent virtual machine and use the same software installation. Linked clones conserve disk space by storing the differences for each virtual machine in delta disks. Linked clones are also created more quickly than full clones. Detailed information on VMware linked cloning is available on the [VMware web site](#).

VMware linked cloning is applied on a per pool basis.

Before You Begin

VMware linked cloning is available for use only if the following conditions are met:

- VMware ESX 4.0 or later must be used.
- A template must have at least one snapshot.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the **Cloning** tab.
4. Select the **Linked Cloning** check box.
5. Click **Save**.

CLI Steps

- Enable linked cloning for a pool.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p linked-cloning=enable pool name
```

In the following example, linked cloning is enabled for a pool named MyPool.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p linked-cloning=enabled MyPool
```

In the following example, linked cloning is disabled for a pool named MyPool

```
# /opt/SUNWvda/sbin/vda pool-setprops -p linked-cloning=disabled MyPool
```

6.7.4. 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 [Section 6.6.3, “How to Import Desktops \(Microsoft Hyper-V\)”](#) section for detailed information.

Oracle VDI Manager Steps

- To enable cloning in an existing pool:
 1. In Oracle VDI Manager, go to **Pools**.
 2. Select a pool.
 3. Select the Cloning tab, and specify the cloning parameters.
 4. At a minimum, define a desktop template to clone from, and select Enable Automatic Cloning.
- To enable cloning in the **New Pool** wizard during pool creation:
 1. Choose the desktop template and select Enable Automatic Cloning.
 2. 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 Oracle 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

- Start automatic cloning in a pool.

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

In the following example, automatic cloning is enabled for the pool MyPool.

```
# /opt/SUNWvda/sbin/vda pool-start MyPool
```

6.7.5. About Clone Customization

Oracle VDI offers two methods for customizing Windows desktops during the cloning process, Microsoft System Preparation (Sysprep), which is often used in Active Directory environments, and Oracle VDI Fast Preparation (FastPrep). Oracle VDI FastPrep is a replacement for Microsoft Sysprep. You can trigger Sysprep from within Oracle VDI Manager.

Sysprep ensures that each desktop clone is assigned its own unique security identifier (SID). The corresponding template revision is automatically marked as Sysprepped once the preparation has completed.

FastPrep is designed to reduce the clone time of each desktop. It leverages Sysprep and changes the computer name of each clone, joins it to a domain, and, optionally, can execute a post-customization script.

6.7.6. How to Debug Fast Preparation Problems

In the event that cloning fails with Fastprep, error codes are often returned. Typically, they are Microsoft Windows System Error Codes returned by the desktop or domain controller when a clone attempts to join the domain. The error codes are described in:

<http://msdn.microsoft.com/en-us/library/ms681381%28v=vs.85%29.aspx>

If further debugging is needed, you can disable the automatic cleanup of failed clones by running the following command:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p cloning.cleanup.failures=disabled
```

With this setting disabled, Oracle VDI does not delete any failed clones, and you can examine a clone to find out why an error occurred.

If issues persist when trying to join a domain, inspect the Windows netsetup.log on the clone in C:\Windows\Debug\netsetup.log for debug output of the attempted join operation.

Once the issue is resolved, enable the automatic cleanup of failed clones by running the following command:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p cloning.cleanup.failures=enabled
```

Failed clones that occur while automatic cleanup is disabled remain on the provider host. You must manually delete these clones using Oracle VDI Manager or the command line.

6.7.7. 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 Oracle VDI. Unlike Microsoft System Preparation, Fast Preparation (FastPrep) does not 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 Oracle VDI Manager.

For more information, see the following:

- [Section 6.6.1, “How to Import Desktops \(Oracle VDI Hypervisor\)”](#)
- [Section 6.6.3, “How to Import Desktops \(Microsoft Hyper-V\)”](#)

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.

2. Select a pool.
3. Go to the **Cloning** tab (or the **Select Template** screen of the **New Pool** wizard).
4. Click **Create** next to **System Preparation**.
5. Select the appropriate **Fast Preparation** option from the drop down for your template OS.
6. 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 for the domain administrator
 - **Computer Container DN** - The DN to place the new computer account in (e.g. OU=Accounting,OU=VDI Center,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 [Section 6.7.1, “How to Clone Desktops \(Oracle VDI Hypervisor\)”](#) and [Section 6.7.4, “How to Clone Desktops \(Microsoft Hyper-V\)”](#) sections.

CLI Steps

- Prepare a pool for sysprepped cloning.

```
# /opt/SUNWvda/sbin/vda pool-create-fastprep -p domain=<domain>,\
domain-admin=<domain-admin>,admin=<admin>,\
windows-release=winxp/win7 -u <user-dir><pool-name>
```

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

Windows desktops require System Preparation for successful cloning by Oracle VDI. 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 Oracle VDI as a template, and select System Preparation on one of the template revisions. Oracle VDI 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 Oracle VDI Manager.



Note

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 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: <http://www.microsoft.com/downloads/en/details.aspx?FamilyID=e5a33392-77a2-4d9c-a70e-8eb1369c85ed>
- Windows XP Service Pack 2 Deployment Tools: <http://www.microsoft.com/downloads/details.aspx?FamilyId=3E90DC91-AC56-4665-949B-BEDA3080E0F6&displaylang=en>
- Windows XP Service Pack 3 Deployment Tools: <http://www.microsoft.com/downloads/details.aspx?FamilyID=673a1019-8e3e-4be0-ac31-70dd21b5afa7&displaylang=en>

- 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 Oracle VDI Manager.

For more information, see the following:

- [Section 6.6.1, "How to Import Desktops \(Oracle VDI Hypervisor\)"](#)
- [Section 6.6.3, "How to Import Desktops \(Microsoft Hyper-V\)"](#)

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Run System Preparation in a template revision.
 - a. Go to 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.
4. Prepare a pool to clone customized desktops based on a System Preparation file.
 - a. Go to the **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 [Section 6.7.1, “How to Clone Desktops \(Oracle VDI Hypervisor\)”](#) and [Section 6.7.4, “How to Clone Desktops \(Microsoft Hyper-V\)”](#) sections.

CLI Steps

1. Run System Preparation in a template revision.
 - a. Choose a template from the pool (template ID).

```
# /opt/SUNWvda/sbin/vda pool-templates pool name
```
 - b. Choose a revision from the template (revision ID).

```
# /opt/SUNWvda/sbin/vda template-revisions template ID
```
 - c. Apply Sysprep to the revision.

```
# /opt/SUNWvda/sbin/vda revision-sysprep revision ID
```

2. Prepare a pool for sysprepped cloning.

To create a System Preparation file for a pool.

```
# /opt/SUNWvda/sbin/vda pool-create-sysprep -p \  
key=<key>,workgroup=<workgroup>,windows-arch=32/64,\  
windows-release=winxp/win7 <pool-name>
```

To apply an existing System Preparation file to new or existing pools.

```
# /opt/SUNWvda/sbin/vda pool-create -p system-preparation=path to filepool name
```

```
# /opt/SUNWvda/sbin/vda pool-setprops -p system-preparation=path to filepool name
```

Example - Enabling System Preparation for a pool of Oracle VM VirtualBox desktops.

```
example% /opt/SUNWvda/sbin/vda pool-templates MyPool
example% /opt/SUNWvda/sbin/vda template-revisions 35
example% /opt/SUNWvda/sbin/vda revision-sysprep 55
example% /opt/SUNWvda/sbin/vda pool-create-sysprep -p \
key=ABC12-DEF34-GHI56-JKL78-MNO90,domain=mydomain.mycompany.com,\
domain-admin=Administrator,windows-arch=64,windows-release=win7 MyPool
```

6.7.9. About Personal Hard Drives

Oracle VDI 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 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.

6.7.10. Clone and Recycle Job Management

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

6.7.10.1. Setting Cloning Production Priorities for Pools

At the pool level, 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.

6.7.10.2. Setting Peak Times for Desktop Providers

At the desktop provider level, 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.

6.8. Assigning Users to Desktops

6.8.1. 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, Oracle VDI 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. In Oracle VDI Manager, go to **Users**.
2. Select a company.
3. To assign a user or a group, go to the **Users and Groups** tab.
 - 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.
4. To assign a custom group, go to the **Custom Groups** tab.
 - a. Click the **Assignment** tab in the custom group's profile.
 - b. In the **Assigned Pools** table, select **Add**.
5. 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.

CLI Steps

- Assign a user to a desktop.
 1. List the available desktops.

```
# /opt/SUNWvda/sbin/vda pool-desktops pool_name
```
 2. Assign a user to a desktop.

```
# /opt/SUNWvda/sbin/vda user-assign --desktop=desktop ID User name
```

Example - Assigning a user to a desktop.

```
# /opt/SUNWvda/sbin/vda pool-desktops "Sales - EMEA"
NAME ID MACHINE_STATE STATUS DN
Solaris 2008.11 De 2
2 Powered Off Available -
# /opt/SUNWvda/sbin/vda user-assign --desktop=2 jdl23456
User/Group jdl23456 assigned to desktop 2
```

- Assign a custom group to a pool.

```
# /opt/SUNWvda/sbin/vda group-assign -p pool name custom group name
```

Example - Assigning a custom group to a pool

```
# /opt/SUNWvda/sbin/vda group-assign -p "Solaris 2008.11 En" "Support EMEA"
Custom Groups [Support EMEA] assigned to pool Solaris 2008.11 En
```

6.8.2. 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 Oracle VDI user groups locally without the need for any changes in your Active Directory or LDAP user directory.

Oracle 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 [RFC 2254](#).

2. Before saving, click Preview to see how the filter configuration will behave. If the filter defines the target group of users, click Save.

6.8.3. 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 Client. With Oracle VDI, 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. In Oracle VDI Manager, go to **Users**.
2. Select a company.
3. Go to the **Users and Groups** tab.
4. Search for a user in the user directory.
5. Click on the user name, and go the **Token** tab.
6. 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.



Note

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

CLI Steps

- 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
```

6.8.4. 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 VDI 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 hardware and Oracle Virtual Desktop Client) without a smart card will get a desktop from this pool.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Users**.
2. Select a company.
3. Go to the **Tokens** tab.
4. Select a token from the **Tokens** table.
5. 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).



Note

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

CLI Steps

- Assign a token to a desktop.

1. List available desktops.

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

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

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

Example - Assigning an existing token to a desktop

```
# /opt/SUNWvda/sbin/vda pool-desktops "Sales - EMEA"
NAME          ID MACHINE_STATE  STATUS      USER      DN
Ubuntu_02      4   Powered Off    Available   -         -
Ubuntu_01      6   Powered Off    Available   -         -
Ubuntu_05      8   Powered Off    Available   -         -

# /opt/SUNWvda/sbin/vda token-assign --desktop=4 Payflex.500d9b8900130200
Token Payflex.500d9b8900130200 assigned to desktop 4
```

- Assign a token to a pool.

```
# /opt/SUNWvda/sbin/vda token-assign --pool=pool nametoken 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
```

6.8.5. 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-idcommentuserid
-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 - -
```

6.8.6. How to Search for Desktops

This task describes how to search for any desktop managed by 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. In Oracle VDI Manager, go to **Pools**.
2. Select **Desktop Search**.
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.

Chapter 7. Accessing Desktops

Table of Contents

7.1. About Desktop Access Methods	131
7.2. Sun Ray Software	133
7.2.1. About the Oracle VDI Sun Ray Kiosk Session	133
7.2.2. How to Adapt the Bundled Sun Ray Kiosk Session	135
7.2.3. How to Access Desktops Using a Sun Ray Client	136
7.2.4. Multi-Monitor Support	140
7.2.5. How to Access the Sun Ray Administration GUI	144
7.2.6. How to Change User Password	144
7.2.7. How to Disable Client Authentication	146
7.2.8. How to Enable Desktop Screen Locking on Sun Ray Clients	147
7.3. Secure Web Access with Oracle Secure Global Desktop	147
7.3.1. How to Set Up Oracle Secure Global Desktop Using the Oracle Secure Global Desktop VDI Broker	147
7.3.2. How to Set Up Oracle Secure Global Desktop and Access a Desktop Using Oracle Secure Global Desktop Application Objects	149
7.4. Remote Desktop Client (RDC)	150
7.4.1. About the Bundled RDP Broker	150
7.4.2. How to Access Desktops with Microsoft RDC	151
7.5. Logging Out of Desktop Sessions	153

7.1. About Desktop Access Methods

Two protocols are supported for connecting client devices to Oracle Virtual Desktop Infrastructure (VDI), Appliance Link Protocol (ALP) and Remote Desktop Protocol (RDP).

ALP is a suite of network protocols that enable communication between Sun Ray Clients and Sun Ray Software servers. A Sun Ray Client can be a Sun Ray hardware unit, or it can be an Oracle Virtual Desktop Client, which is a software application. The Sun Ray Software provides the infrastructure for displaying desktops to Sun Ray Clients. The Sun Ray Software runs the Oracle VDI Kiosk Session, which runs the Sun Ray Windows connector program (also known as `uttsc`). The Sun Ray Windows connector is an RDP client for the Sun Ray environment and this connects the user to the virtual machine running the desktop.

The Remote Desktop Protocol is a protocol developed by Microsoft for securely connecting remote clients and servers. Oracle VDI includes a built-in RDP broker that enables an RDP client to access the virtual desktops provided by Oracle VDI. Typically this method of access is used with either Oracle Secure Global Desktop, which includes an RDP Client known as `ttatsc`, or the Microsoft RDP client, known as Remote Desktop Connection.

The following table contains a list of features that are supported by the different client access methods supported by Oracle VDI.

Feature	Sun Ray Hardware	Oracle Virtual Desktop Client	Oracle Secure Global Desktop	Microsoft Remote Desktop Connection
Audio recording (input audio)	✓	✓	x	✓

Feature	Sun Ray Hardware	Oracle Virtual Desktop Client	Oracle Secure Global Desktop	Microsoft Remote Desktop Connection
Audio redirection	✓	✓	✓	✓
Auto-logon	✓	✓	✓	✓
Clipboard redirection	✗	✗	✓	✓
COM port mapping	✓	✓	✓	✓
Compression	✓	✓	✓	✓
Drive redirection (client drive mapping)	✗	✗	✓	✓
Multi-desktop	✓	✓	✓	✓
Multi-monitor	✓	✓	✗	✓ (RDP 7 only)
Network security (encryption level)	✓	✓	✓	✓
Session directory	✓	✓	✓	✓
Smart card device redirection	✓	✓	✓	✓
Time zone redirection	✓	✓	✓	✓
USB device redirection	✓	✗	✗	✓
Video acceleration	✓	✓	✗	✓ (RDP 7 only)
Windows printer mapping (client printing)	✓	✓	✓	✓

The list of features in the table above is only a statement of the capabilities of each of the client access methods. The features that can actually be used for a virtual desktop depend on the RDP protocol selected for the pool and the configuration of the virtual desktop itself. For more information, see [Section 6.1.7, “Choosing Between VRDP and MS-RDP”](#).

For Sun Ray Clients, support for the list of features in the above table depends on the version of the hardware, or the software release, used. Check the documentation for your products to see what is supported.

For Oracle Secure Global Desktop support for the list of features in the above table depends on the software release. Check the documentation for your product to see what is supported.

For Microsoft Remote Desktop Connection, support for the list of features in the above table depends on the version of Remote Desktop Connection used. Check the documentation for your version to see what is supported.

Color Depth

Oracle Secure Global Desktop does not support 15-bit color depths. If this color depth is specified for a virtual desktop, 8-bit color is used instead.

32-bit color is available on Windows Vista or Windows Server 2008 and later platforms. To display 32-bit color, the client device must be capable of displaying 32-bit color.

Encryption Level

You can only use the Low, Client-compatible, or High encryption levels with Oracle Secure Global Desktop and Sun Ray Clients. The Federal Information Processing Standards (FIPS) encryption level is not supported.

Multi-Monitor and Windows 7

Not all editions of Windows 7 include multi-monitor support, see the [Microsoft Remote Desktop Connection FAQ](#) for details.

Transport Layer Security

Oracle Secure Global Desktop does not support the use of Transport Layer Security (TLS) for server authentication, and to encrypt Terminal Server communication.

7.2. Sun Ray Software

When you install and configure Oracle VDI, you also install and configure the bundled release of Sun Ray Software, see [Section 1.3, "About the Oracle VDI Package Software"](#).

To assist Oracle VDI administrators who are not familiar with Sun Ray Software, the bundled Sun Ray Software is configured specifically for use with Oracle VDI. The information in this section provides only the information needed to provide access to Oracle VDI desktops using Sun Ray clients.

Administrators who are familiar with Sun Ray Software might want to adapt the default configuration to meet their requirements. [Appendix B, Defaults for the Software Bundled With Oracle VDI](#) has details of the default configuration.

For detailed information about Sun Ray Software and Sun Ray Clients, see Sun Ray Products Documentation at <http://www.oracle.com/technetwork/documentation/sun-ray-193669.html>.

7.2.1. About the Oracle VDI Sun Ray Kiosk Session

Sun Ray Software is typically used to provide access to standard UNIX or Linux platform desktop sessions. However, other session types can be supported by using Sun Ray Kiosk mode. Oracle VDI comes with a predefined Kiosk session, called **Oracle Virtual Desktop Infrastructure**. This Kiosk session uses the Sun Ray Windows connector to establish a remote desktop protocol (RDP) connection to a virtual machine.

Typically, a Sun Ray Kiosk session starts when a user inserts a smart card (token) into a Sun Ray Client. First a login dialog is displayed, where the user enters a user name, a password, and optionally a Windows domain. After successful authentication, the system contacts the Oracle VDI service to determine the desktops assigned to the user. If multiple desktops are available, a desktop selector screen is displayed. Once the user selects a desktop, the Sun Ray Windows connector starts and connects to the virtual machine running the desktop. If the virtual machine is not already running, a wait screen is displayed while the machine starts. See [Section 7.2.3, "How to Access Desktops Using a Sun Ray Client"](#) for examples.

Users do not have to use a smart card to log in. By default the Kiosk session is enabled for both smart card and non-smart card access.

By default, all users must authenticate to Oracle VDI before they can access a desktop. The Oracle VDI service contacts the user directory for the verification of the provided user credentials. If authentication succeeds the connection to the selected desktop is established. These credentials can be passed to a Windows guest operating system so that users can be automatically logged into their desktop.

Authentication to Oracle VDI can be disabled, see [Section 7.2.7, "How to Disable Client Authentication"](#). If you disable Client Authentication, the user must either insert a smartcard, or provide a user name and no

password (in the login dialog), in order to access their desktop. The available desktops are the desktops assigned to the token, or the desktops assigned to the user name. In this situation, it is best practice to configure the desktop operating system to require authentication.

The login and desktop selector dialogs can also be disabled. When the desktop selector is disabled, users are always connected to their default desktop without authenticating to Oracle VDI. Because users cannot enter a user name or password before accessing their desktop, you must disable Client Authentication. If you do this, users must insert a smartcard to enable Oracle VDI to determine pool or desktop assignments.

The appearance and behavior of the Kiosk session can be configured using a number of session parameters. There are two sort of parameters:

- **Desktop selector options:** these settings are for the VDA session and affect the login and desktop selector dialogs.
- **Sun Ray Windows connector options:** these settings are for Sun Ray Windows connector (also known as `uttscc`) and affect the quality of the RDP connection.

The options are explained in the rest of this section. [Section 7.2.2, “How to Adapt the Bundled Sun Ray Kiosk Session”](#) describes how to configure and apply the options.

Desktop Selector Options

The following table shows the available desktop selector options.

Argument	Description
<code>-n</code>	Disables the login and desktop selector dialogs.
<code>-d <domain></code>	Sets a default domain in the Domain field.
<code>-l <domain1>,<domain2>,...</code>	Populates the Domain dropdown list with the specified domains. Example: <code>-l north.example.com,south.example.com</code>
<code>-t secs</code>	Specifies the timeout in seconds applied after a user logs in. The default is three minutes.
<code>-j path</code>	Path to the Java Runtime Environment (JRE) used to display the login and desktop selector dialogs. Example: <code>-j /usr/java6</code>
<code>-a</code>	Enables the User Name field. Normally the User Name field is read-only. Using this option enables users to log in with a different user name.
<code>-h</code>	Hides the User Name field.
<code>-o</code>	Hides the Domain field.
<code>-w</code>	Shows the Password field.
<code>-r <res1>,<res2>,...</code>	Populates the Screen Resolution menu (under More Options) with a list of resolutions. Example: <code>-r 1920x1200,2560x1600</code>
<code>-v <log level></code>	Enables verbose logging. The log levels are <code>FINEST</code> , <code>INFO</code> , <code>WARNING</code> , <code>SEVERE</code> , and <code>ALL</code> .

Previous releases of Oracle VDI supported a long format for these options, for example `--no-desktop-selector` instead of `-n`. The long options are deprecated, do not use them.

If you disable the login and desktop selector dialogs with the `-n` option, users cannot enter a user name or password before accessing their desktop. If you use this option, you must also disable client authentication. See [Section 7.2.7, “How to Disable Client Authentication”](#). Users must insert a smartcard to access their default desktop.

If you enable verbose logging with the `-v` option, additional log messages are output to standard error (stderr). The log messages can be viewed in the following locations:

- **Oracle Solaris platforms:** `/var/dt/Xerrors`
- **Oracle Linux platforms:** `/var/opt/SUNWkio/home/utku<XX>/.xsession-errors`

By default, the Oracle VDI login and desktop selector dialogs use the JRE included with Oracle VDI. However, an alternative JRE can be specified using the `-j` option. For the best support for locales and the latest improvements to Java Swing, use Java 6.

Sun Ray Windows Connector (uttsc) Options

The `uttsc` man page has the complete listing of the supported options.

7.2.2. How to Adapt the Bundled Sun Ray Kiosk Session

1. Log in to the Sun Ray Administration GUI.

See [Section 7.2.5, “How to Access the Sun Ray Administration GUI”](#).

2. Go to the Advanced tab.
3. Click the Kiosk Mode link.

The Kiosk Mode page is displayed.

4. Click the Edit button.

The Edit Kiosk Mode page is displayed.

5. In the Arguments field, type the required Kiosk session arguments.

The syntax for the Kiosk session arguments is:

```
desktop_selector_options -- uttsc_options
```

The available Kiosk options for Oracle VDI are described in [Section 7.2.1, “About the Oracle VDI Sun Ray Kiosk Session”](#).

For example:

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

6. Click OK.
7. (Optional) Perform a cold restart of Sun Ray services.

The new settings only take effect for new Kiosk sessions. To enforce the settings for existing sessions, you must perform a cold restart of Sun Ray services. This terminates all existing sessions and creates new Kiosk sessions as necessary.

- a. Go to the Servers tab.
- b. Select all servers in your Oracle VDI environment.
- c. Click Cold Restart.

This operation can take several minutes to complete.

7.2.3. How to Access Desktops Using a Sun Ray Client

This section provides examples of how users access their desktops using Sun Ray Clients (Sun Ray hardware or Oracle Virtual Desktop Client).

Depending on the configuration of the Sun Ray Kiosk session, users might have to log in before they can access a desktop. If a user is assigned multiple desktops, they also might be able to select the desktop. See [Section 7.2.1, “About the Oracle VDI Sun Ray Kiosk Session”](#) for more details.

Example 1

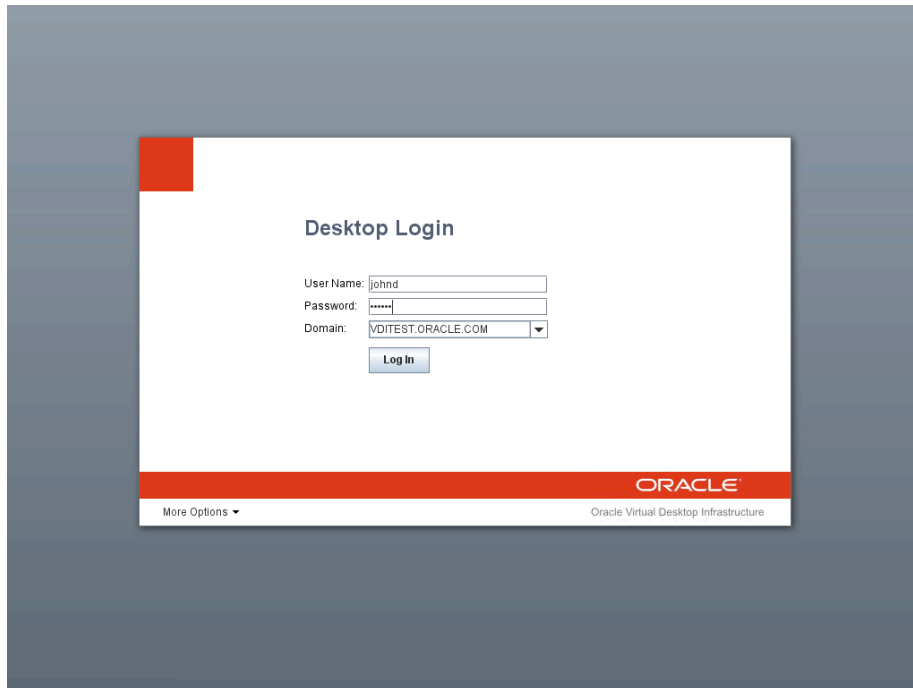
In this example, a user logs in to Oracle VDI and then selects the desktop to access.

1. Log into Oracle VDI.

Insert a smart card (token) into a Sun Ray Client that is connected to an Oracle VDI host. The token is assigned to a pool, or directly to a desktop.

The login dialog is displayed.

Figure 7.1. Oracle VDI Login Dialog

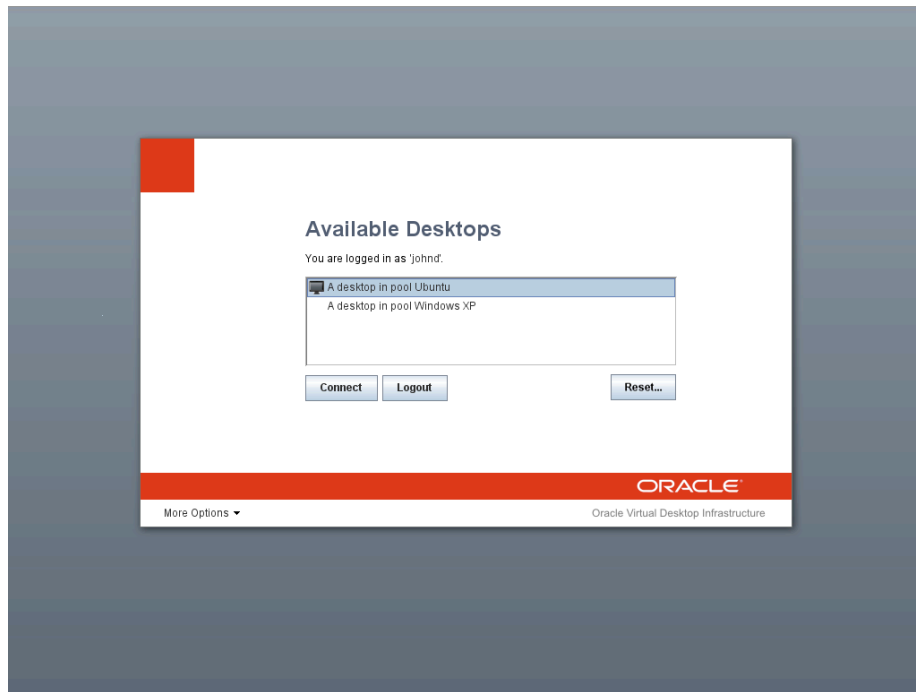


The user must provide a user name, password, and optionally a Windows domain.

2. Select a desktop or pool.

After successful authentication, the system determines the desktops and pools assigned to the user. If multiple desktops are assigned to the user, the desktop selector dialog is displayed. The dialog is not displayed, if only one desktop is assigned.

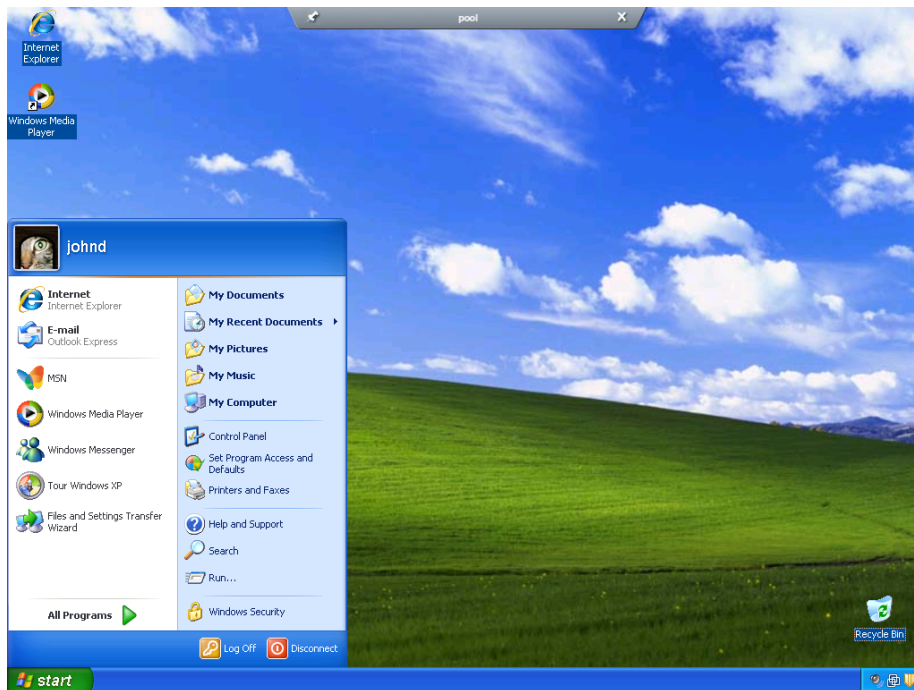
Figure 7.2. Oracle VDI Desktop Selector Dialog



3. Work with the desktop.

Once the user selects a desktop, the Sun Ray Windows connector starts and displays the desktop.

Figure 7.3. Oracle VDI Windows Desktop



At any time, the user can disconnect from the desktop by moving your mouse up to the top of the screen and clicking the "X" on the remote desktop pulldown menu. The user is disconnected from the current desktop session and either the desktop selector dialog or the login dialog is displayed.

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

Example 2

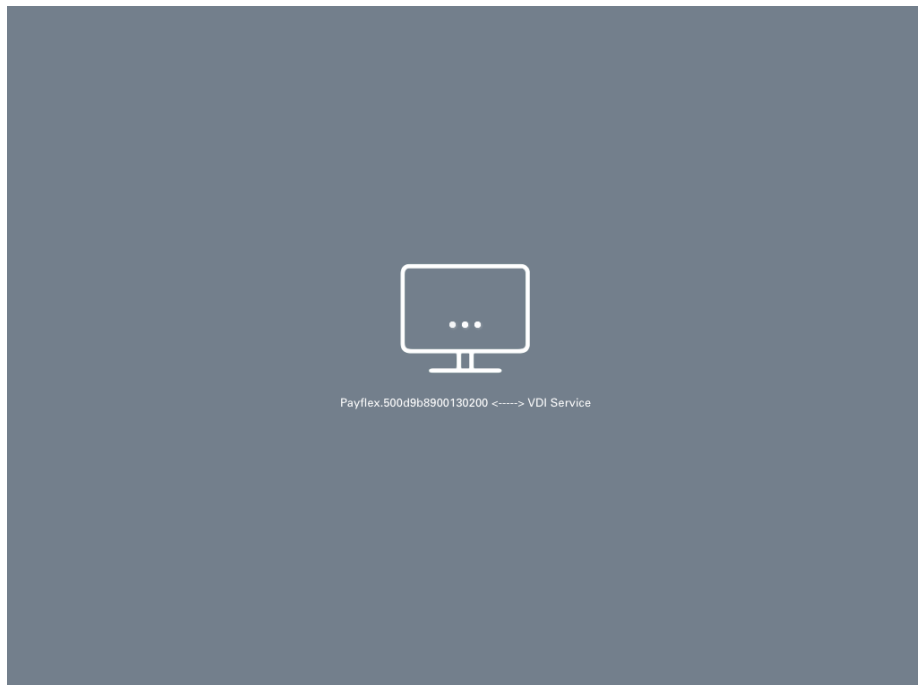
In this example, a user is not required to log in to Oracle VDI and can access only their default desktop.

1. Start the desktop.

Insert a smart card (token) into a Sun Ray Client that is connected to an Oracle VDI host. The token is assigned to a pool, or directly to a desktop.

Oracle VDI determines the default desktop assigned to the user. In this example, the desktop is not already running and so a wait screen is displayed while the desktop is started.

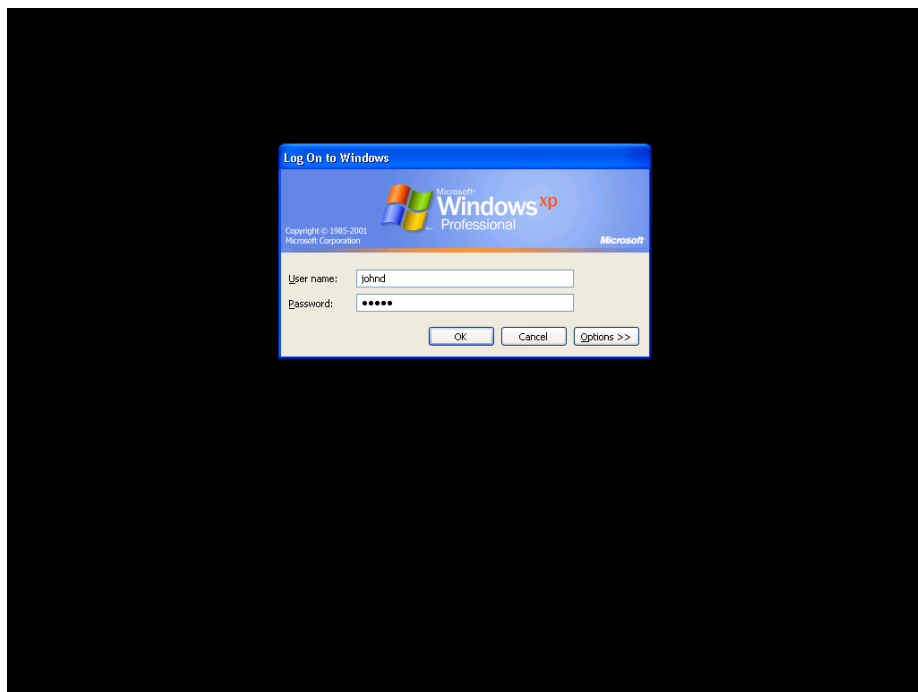
Figure 7.4. The Wait Screen



2. Log in to the desktop.

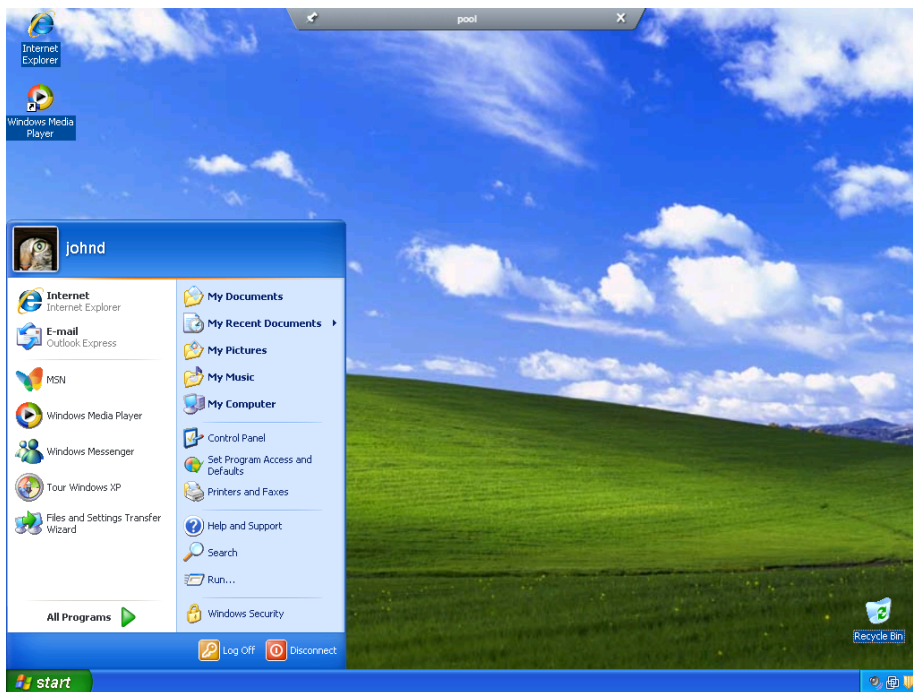
In this example, the standard Windows login screen is displayed because of the configuration of the guest operating system requires a user name and password (and potentially the Windows domain).

Figure 7.5. Windows Login Screen



3. Work with the desktop.

Figure 7.6. Oracle VDI Windows Desktop



After successful authentication, the desktop is displayed. The behavior is the same as for a standard Windows PC.

7.2.4. Multi-Monitor Support

The Multi-Monitor feature enables the use of more than one monitor connected to a Sun Ray Client 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 Client (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.

7.2.4.1. Multi-Desktop

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

Figure 7.7. Connecting to Multiple Desktops with Multiple Monitors

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**.

7.2.4.2. 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.

Figure 7.8. Multiple Monitors

7.2.4.3. Hotdesking and Multi-Monitor Feature

There is a possibility that moving from one Sun Ray Client 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.

7.2.4.4. Sun Ray Multihead Groups

The Sun Ray 2FS and Sun Ray 3 Plus Clients support two monitors. In order to create a large array of monitors, several Sun Rays Clients can be hooked together to form a multihead group. When configuring multihead groups, ensure that XINERAMA is left disabled. See the *Multiple Monitor Configurations* chapter in the [Sun Ray Software 5.2 Administration Guide](#).

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

Figure 7.9. Multihead Group and Multiple Desktops



Figure 7.10. Multihead Group and Single Desktop

7.2.4.5. How to Enable Support for Multiple Monitors

1. Edit the template and configure the display properties to extend the desktop to multiple monitors.

If you are using Sysprep, do not perform this step because the monitor configuration is removed during cloning. If you use FastPrep, the monitor configuration is preserved.

- a. In the template, go to the **Start** menu and select **Control Panel**.
 - b. Go to **Appearance and Personalization** → **Personalization** → **Display Settings**.
 - c. Select **Identify Monitors** and position the monitors.
2. Configure the required number of monitors for the desktops in a pool.
 - a. In Oracle VDI Manager, go to *Pools* and select a pool.
 - b. Go to the **Settings** tab.
 - c. In the Sun Ray Client section, select the required number of monitors in the **Monitors** list.

The virtual machine is configured with one graphics card for each monitor.

3. Restart all running desktops in the pool.

You must restart all running desktops so that the graphics card changes are detected in the virtual machine. If you do not do this, users might experience connection problems when they connect to their desktop. Existing desktops that are powered off, detect the graphics card changes when they are next powered on.

- a. Go to the **Desktop** tab.

- b. Select all the running desktops in the pool.

Select all the desktops except those with a Machine State of powered off.

- c. Click Restart.

The display properties in existing desktops must be configured individually to extend the desktop to multiple monitors.

7.2.5. 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 <https://<server-name>:1660>.

If you enter an <http://> URL, you are redirected to an <https://> URL.

The browser displays a security warning and prompts you to accept the security certificate.

2. Accept the security certificate.

The login screen is displayed.

3. Log in as super user (root) with corresponding password.



Note

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

7.2.6. How to Change User Password

The desktop login/selector dialog allows end-users working from Sun Ray Clients to update their password in the user directory.



Note

Password Change is not offered when Client Authentication is disabled; see [Section 7.2.7, "How to Disable Client Authentication"](#).

Oracle VDI supports password change on the following directory servers:

- Active Directory (from Windows Server 2003 and 2008)
- Oracle Directory Server Enterprise Edition

The authentication type (see [Section 4.1, "About User Directory Integration"](#)) selected to integrate the user directory with Oracle VDI affects the password change functionality:

- Kerberos authentication (see [Section 4.5, "How to Set Up Kerberos Authentication"](#)) and Public Key authentication (see [Section 4.6, "How to Set Up Public Key Authentication"](#)) allow end-users to change their password before it has expired as well as after expiration.
- LDAP Anonymous Authentication ([Section 4.7, "How to Set Up Anonymous Authentication"](#)), LDAP Simple Authentication ([Section 4.8, "How to Set Up Simple Authentication"](#)) and LDAP Secure

Authentication ([Section 4.9, “How to Set Up 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.

**Note**

A default restriction in Active Directory prevents password update from an LDAP Simple Authentication.

7.2.6.1. The user password has already expired

If integrating with an Active Directory server using Kerberos authentication (see [Section 4.5, “How to Set Up Kerberos Authentication”](#)) or Public Key authentication (see [Section 4.6, “How to Set Up Public Key Authentication”](#)):

1. The end-user enters her login credentials in the login dialog (see [Section 7.2.3, “How to Access Desktops Using a Sun Ray Client”](#)).
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 (see [Section 7.2.3, “How to Access Desktops Using a Sun Ray Client”](#)).

If using an LDAP type of authentication (see [Section 4.1, “About User Directory Integration”](#)):

1. The end-user enters her login credentials in the login dialog (see [Section 7.2.3, “How to Access Desktops Using a Sun Ray Client”](#)).
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.

7.2.6.2. The user password has not expired yet

**Note**

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 (see [Section 4.1, “About User Directory Integration”](#)) (provided the directory server supports end-users to change their password):

1. The desktop selector dialog (see [Section 7.2.3, “How to Access Desktops Using a Sun Ray Client”](#)) 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.

7.2.6.3. 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 [Section 4.5, “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 [Section 7.2.6, “How to Change User Password”](#).

In case of problems, check the log files, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

7.2.7. 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 Oracle 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.



Note

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 Oracle 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 Oracle VDI service.



Note

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 Oracle 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
```

7.2.8. How to Enable Desktop Screen Locking on Sun Ray Clients

This procedure shows you how to configure screen locking for Sun Ray Software 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 lose 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
```

7.3. Secure Web Access with Oracle Secure Global Desktop

Oracle VDI supports secure web access through Oracle Secure Global Desktop.

The mechanism for accessing desktops using Oracle Secure Global Desktop has changed since previous releases. The My Desktop Application Object and corresponding expect script are no longer required for Oracle VDI.

Oracle Secure Global Desktop release 4.6 includes a VDI Broker as part of the Dynamic Launch feature. To make use of the Oracle Secure Global Desktop VDI Broker, Oracle Secure Global Desktop and the Oracle VDI must be installed on the same host.

The steps below are a summarized version of the instructions in the Oracle Secure Global Desktop documentation. For the detailed information, see *Integrating Oracle Secure Global Desktop with Oracle VDI* in the [Oracle Secure Global Desktop 4.6 Administration Guide](#) and the [Oracle Secure Global Desktop 4.6 Installation Guide](#)

7.3.1. How to Set Up Oracle Secure Global Desktop Using the Oracle Secure Global Desktop VDI Broker

1. Install Oracle Secure Global Desktop.
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 VDI. This can be done using the Oracle Secure Global Desktop command line or Administration Console.

For example, to create a full screen kiosk Windows application using the Oracle Secure Global Desktop 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.

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 Oracle Secure Global Desktop 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 Oracle Secure Global Desktop Administration Console.

6. Access a desktop.
 - a. Log into the Oracle Secure Global Desktop webtop.

Use the URL <http://<sgd-server>/sgd>) as the user who has been assigned the pool/desktop.

The Windows Application Object that you have 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.

7.3.2. How to Set Up Oracle Secure Global Desktop and Access a Desktop Using Oracle Secure Global Desktop Application Objects

If it is not possible to install Oracle Secure Global Desktop and the Oracle VDI on the same host, the Oracle Secure Global Desktop VDI Broker will not work. In that case, configure Oracle Secure Global Desktop using the procedure below.

1. Install Oracle Secure Global Desktop.
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 VDI. This can be done using the Oracle Secure Global Desktop command line or Administration Console.

For example, to create a full screen kiosk Windows application using the Oracle Secure Global Desktop 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 Oracle Secure Global Desktop server and the Oracle VDI 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"
```

- 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"
```

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 Oracle Secure Global Desktop Administration Console.

5. Access a desktop.

- a. Log into the Oracle Secure Global Desktop webtop.

Use the URL <http://<sgd-server>/sgd>) 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.

7.4. Remote Desktop Client (RDC)

7.4.1. About the Bundled RDP Broker

Oracle VDI 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.

7.4.1.1. 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 service on behalf of the client and will ask to startup the desired desktop.
3. The Oracle VDI service will first verify the username/password combination if client authentication is enabled on the service side (default), see [Section 7.2.7, "How to Disable Client Authentication"](#).
4. If authentication succeeds, the corresponding desktop will be started up and the Oracle VDI 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 Oracle VM 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; see: http://download.microsoft.com/download/8/6/2/8624174c-8587-4a37-8722-00139613a5bc/TS_Session_Directory.doc.

6. Finally, this RDP redirection packet is sent back to the RDP client and the client will redirect accordingly.

7.4.1.2. Supported RDP Clients

RDP clients that support all the above mentioned mechanism and that have been tested with Oracle VDI are:

- The Microsoft RDP client (also known as remote desktop connection)
- The Sun Ray Windows connector (also known as `uttsc`)
- The Oracle Secure Global Desktop Remote Desktop Client (also known as `ttatsc`)

Other clients may work, but have not been tested by QA.

7.4.1.3. 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 server
```

To connect to a specific desktop, run the following.

```
/opt/SUNWuttsc/bin/uttsc -u username::pool=poolname,desktop=desktopId \  
-d domainIP of broker -- any secondary server
```

7.4.1.4. Security Considerations

Oracle VDI authenticates users each time they sign into their desktop. If you would prefer to disable this feature, refer to the [Section 7.2.7, "How to Disable Client Authentication"](#) section.

7.4.2. How to Access Desktops with Microsoft RDC

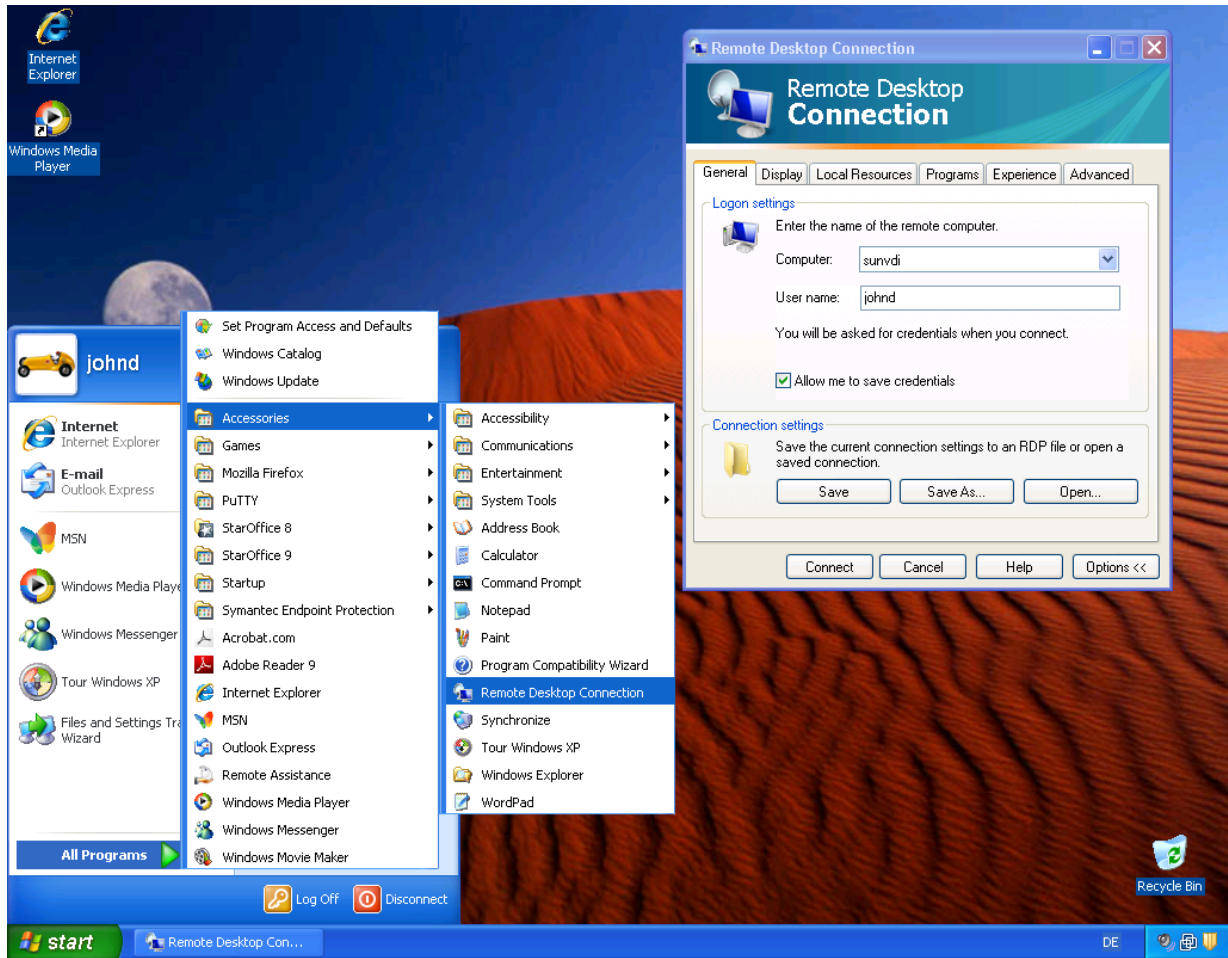
Oracle VDI includes a built-in RDP broker that allows easy desktop access leveraging the *Remote Desktop Protocol (RDP)*. This way users can take advantage of existing Windows PCs for accessing desktops. There is typically no need to install any additional software on your PC. Both Windows XP and Windows 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. Click on **Start, All Programs, Accessories, Remote Desktop Connection**.

2. In the dialog, specify as Computer the name, or IP address of the host running the Oracle VDI.
3. Specify the user name, and optionally Windows domain. Click **Connect**.
4. A popup dialog will come up asking for the user password. Enter the password and click **OK**.
5. After a while, the desktop should be displayed, and be ready to use.

Figure 7.11. Microsoft RDC Connection



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.

Accessing a Specific Desktop or Pool

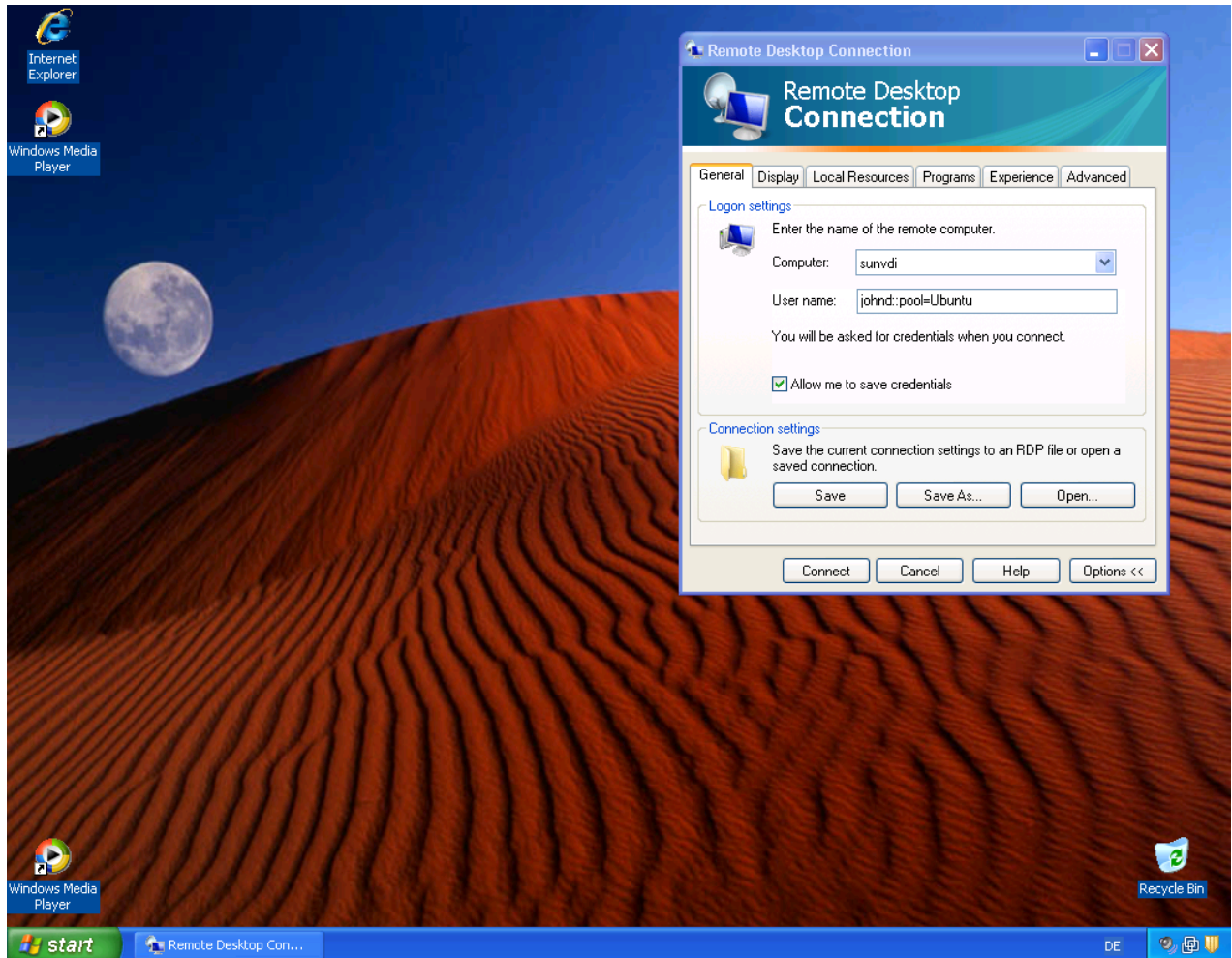
If multiple desktops are assigned to a user, then the Oracle VDI connects to the user's *default* desktop, which can be defined using Oracle VDI Manager.

Alternatively, it is possible to specify the desired desktop or pool when opening the remote desktop connection. To do this, 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`

Figure 7.12. Specifying Pool Name and Desktop ID for Microsoft RDC



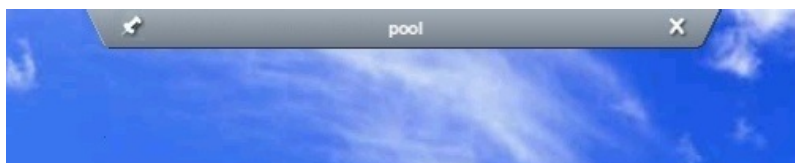
If you frequently switch between various desktops, then it is convenient to store the remote desktop connection settings for each desktop in an RDP file, using the **Save As** button in **Connection Settings**. You can then create shortcuts to these files allowing you to initiate a connection via a simple mouse double-click.

7.5. Logging Out of Desktop Sessions

Users can end their desktop sessions in more than one way and the methods depend on whether the VRDP protocol or the MS-RDP protocol is used to connect to the desktop.

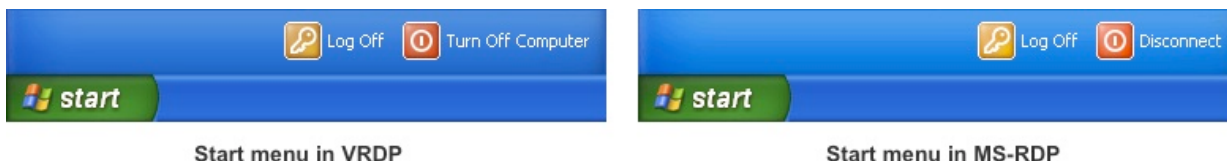
A user can log out of their desktop by clicking the "X" button on the Sun Ray Windows connector toolbar at the top of the screen. The toolbar is hidden until the mouse pointer is moved to the top of the screen. With this method, there is no difference between VRDP and MS-RDP.

Figure 7.13. The Sun Ray Windows Desktop Connector Toolbar



A user can also use the Windows Start menu to log out of their desktop. However the Start menu has different options depending on whether VRDP or MS-RDP is used, as shown in the following figure.

Figure 7.14. Start Menus



The Log Off button in the Start menu has a similar effect as the "X" button on the Sun Ray Windows connector toolbar and there is no difference between VRDP or MS-RDP.

If VRDP is used, the Start menu has a Turn Off Computer button. Because VRDP connects on the virtual machine level, if a user clicks this button, the Windows desktop shuts down just like a real computer. If a user shuts down their desktop in this way, the next time they log in, they have to wait for the virtual machine to go through the full boot sequence.

If MS-RDP is used, the Start menu has a Disconnect button. Because MS-RDP connects at the operating system level, if a user clicks this button, they log out of Windows and their Oracle VDI desktop session, but do not shut down the virtual machine. The next time they log in, they do not have to wait for the virtual machine to boot.

If VRDP is used and login performance is a priority, users must log out by using either The Log Off button in the Windows Start menu, or the "X" button in the Sun Ray Windows connector toolbar.

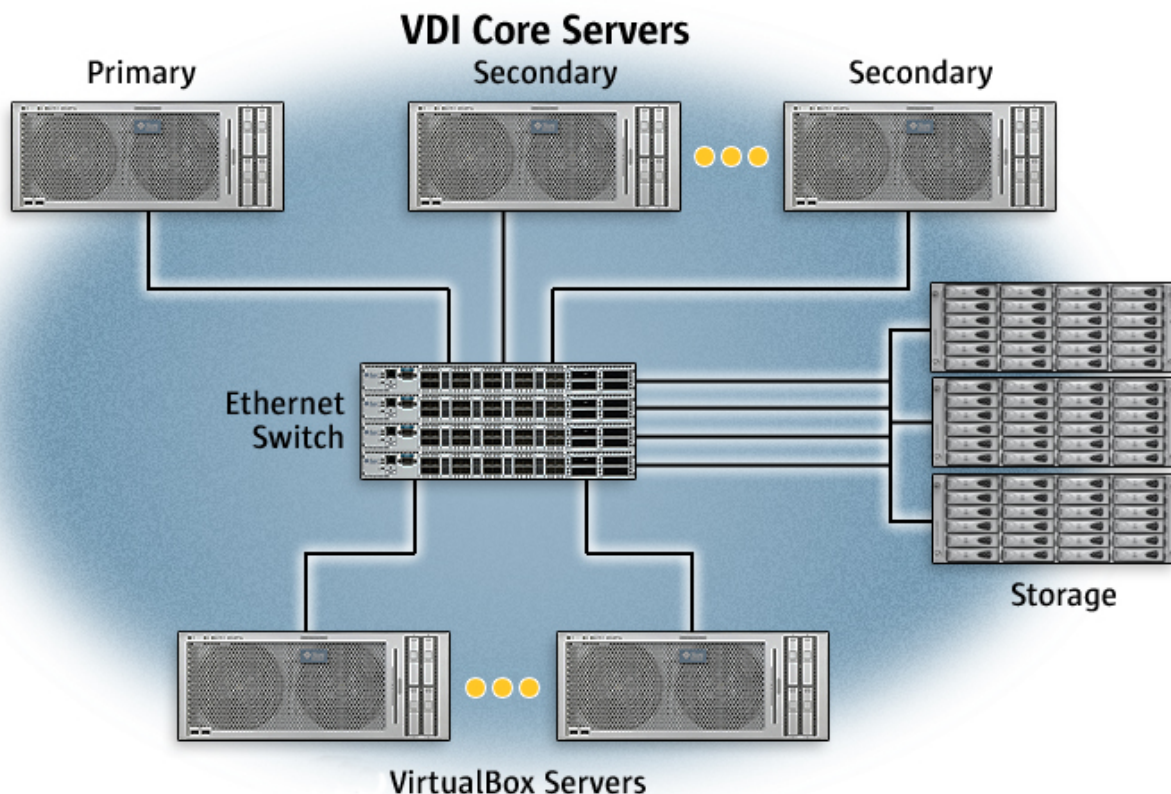
Chapter 8. Performance and Tuning

Table of Contents

8.1. Introduction to Oracle VDI Performance and Tuning	155
8.2. Oracle VDI Hosts	157
8.2.1. Sizing Guidelines for Oracle VDI Servers	157
8.2.2. Controlling the Number of Sessions on an Oracle VDI Host	157
8.3. Virtualization Hosts	157
8.3.1. Sizing Guidelines for Oracle VM VirtualBox Servers	157
8.4. Storage	158
8.4.1. Sizing Guidelines for Storage Servers	158
8.4.2. About ZFS Storage Caches	159
8.4.3. About Block Alignment	160
8.4.4. Oracle VDI Global Settings for Storage	163
8.4.5. Managing the ZIL on Oracle Solaris Platforms	164
8.5. Networking	165
8.5.1. How to Configure a Dedicated iSCSI Network	166
8.5.2. How to Configure Link Aggregation	166
8.5.3. How to Configure a VLAN	169
8.6. Virtual Machines	170
8.6.1. How to Configure Desktop Resources Per Pool (Oracle VDI Provider)	170
8.6.2. Optimizing Windows 7 Desktop Images	171
8.6.3. Optimizing Windows Vista Desktop Images	174
8.6.4. Optimizing Windows XP Desktop Images	177
8.6.5. Optimizing Desktop Images for Other Operating Systems	181

8.1. Introduction to Oracle VDI Performance and Tuning

The following diagram shows a typical hardware environment for an Oracle VDI deployment.

Figure 8.1. Typical Hardware Environment for Oracle VM VirtualBox Virtualization Platform

A production deployment consists of one primary Oracle VDI host and at least one secondary Oracle VDI host to provide redundancy. The Oracle VDI servers host the embedded MySQL Server database for the Oracle VDI data, route information between clients and desktops, and provide the broker functionality which delivers the desktops to the clients. Alternatively, remote databases are also supported. The Oracle VM VirtualBox servers run the virtual machines which provide the desktops. The storage servers provide the virtual disks which are interpreted as physical disks by the operating systems running within the virtual machines. The iSCSI protocol is used to transfer the disk data between the Oracle VM VirtualBox servers and the storages. That iSCSI data creates a major part of the total network traffic of an Oracle VDI system.

Other consumers of network bandwidth are the clients of Oracle VDI: Sun Ray Clients, Oracle Secure Global Desktop, and RDC clients. The clients connect to the Oracle VM VirtualBox servers through the Oracle VDI servers. In the case of a Sun Ray client, which uses the ALP protocol to transfer the desktop graphics, the Oracle VDI servers convert the RDP protocol received by the Oracle VM VirtualBox servers to the ALP protocol. So, there is one data stream for each client connection between the client, the Oracle VDI server, and the Oracle VM VirtualBox server. RDP clients such as the Sun Ray Windows connector (utts), connect to the Oracle VDI server which, in turn, uses the RDP Redirect feature to instruct the clients to connect to the Oracle VM VirtualBox servers directly as there is no need to translate the RDP protocol. In this case, there is a data stream between the client and the Oracle VM VirtualBox server.

This chapter provides sizing, performance, and tuning guidelines for Oracle VDI deployments.

The sizing information is derived from a sizing test with 1000 desktops running a script to simulate an office workload of a "heavy worker", as defined in the [VMware VDI Server Sizing and Scaling Guide](#). The information is provided as a general guideline only. The workload is different for every installation

and relatively small changes in the usage patterns can have noticeable effects on the requirements. For assistance with sizing, contact Oracle Sales or Support.

8.2. Oracle VDI Hosts

8.2.1. Sizing Guidelines for Oracle VDI Servers

The primary Oracle VDI server requires a dual-core CPU and 2 GB of memory. As long as the Oracle VDI services are not configured on that server, these hardware requirements do not change with the number of running desktops.

The secondary Oracle VDI server requirements for the **number of cores** and **memory size** varies with the number of running desktops supported, as well as the required **network bandwidth**. The bandwidth also varies with the content displayed. The numbers given below are typical for office work. Displaying videos or web pages with Flash content can increase the required bandwidth.

- **Number of cores** = number of running desktops / 20

Example: Two secondary Oracle VDI servers with 8 CPUs and 4 cores per CPU can serve $2 \times 8 \times 4 \times 20 = 1280$ running desktops

- **Memory size [MB]** = number of desktops x 32 MB + 2048 MB

Example: Two secondary Oracle VDI servers with 64 GB of memory can serve $(2 \times 64 \times 1024 \text{ MB} - 2 \times 2048 \text{ MB}) / 32 \text{ MB} = 3968$ running desktops

- **Network bandwidth [Mb/s]** = number of running desktops x 0.15 [Mb/s]

Example: Two secondary Oracle VDI servers with one 1 Gb Ethernet interface can serve $2 \times 1024 / 0.15 \text{ Mb/s} = 13653$ running desktops

8.2.2. Controlling the Number of Sessions on an Oracle VDI Host

By default, an Oracle VDI host can host 100 sessions. The number of sessions is set when you configure Oracle VDI.

To change the number of sessions on a configured Oracle VDI host, run the following command as root:

```
# /opt/SUNWkio/bin/kioskuseradm extend -c <count>
```

8.3. Virtualization Hosts

8.3.1. Sizing Guidelines for Oracle VM VirtualBox Servers

We found that the 'VMs/core' unit, while being striking, is a fuzzy statement as the available CPUs today differ by at least a factor of 2 in performance and that even ignores older CPUs customers may want to reuse. Therefore we decided to also provide the 'SPEC CINT2006 Rate (peak) / VM' value. Statements made based on this unit are valid for a longer time as they abstract from a concrete CPU, while statements based on 'VMs/core' hold true for cores showing roughly the same performance only.

CINT values for a vast number of CPUs can be looked up from the database of the Standard Performance Evaluation Corporation (SPEC) at <http://www.spec.org/cpu2006/results/rint2006.html> or by running the provided test suite.

The numbers for this section have been updated based on a new test run. We were able to run 100 VMs on a X4170 with two E5520 CPUs having 4 cores each. The SPEC CINT2006 Rate (peak) for servers with two E5520 CPUs is ~200 which results in a cint / VM value of 2.

- **Number of cores** = number of running desktops / 12.5

Example: A server roughly equivalent to a X4170 with two E5520 CPUs can support up to $2 \times 4 \times 12.5 = 100$ running desktops

- **Memory size [MB]** = number of running desktops x memory size of a desktop x 1.2 + 1024 MB

Example: A server with 64 GB of memory can support $64 \times 1024 \text{ MB} - 1024 \text{ MB} / (512 \text{ MB} \times 1.2) = 105$ running desktops of 512 MB in size

- **Network bandwidth [Mb/s]** = storage network bandwidth / number of Oracle VM VirtualBox servers



Note

At least 20% of the available CPU power, memory size and network bandwidth should be available as security margin.

8.4. Storage

8.4.1. Sizing Guidelines for Storage Servers

The recommended disk layout is RAID 10, mirrored sets in a striped set, with ZFS striping the data automatically between multiple sets. This layout is called "mirrored" by the 7000 series. While this disk layout uses 50% of the available disk capacity for redundancy, it is faster than RAID 5 for intense small random read/writes, which is the typical access characteristic for iSCSI.

The storage servers provide the virtual disks that are accessed by Oracle VM VirtualBox through iSCSI. Because iSCSI is a CPU-intensive protocol the **number of cores** of the storage server are a decisive factor for its performance. Other important factors are the memory size (cache), the number of disks, and the available network bandwidth.

The **network bandwidth** is very volatile and determined by the relation of desktops starting up (*peak network bandwidth*) and desktops that have cached the applications in use (*average network bandwidth*). Starting a virtual machine (XP guest) creates a network load of 150 MB which needs to be satisfied in around 30 seconds. If many desktops are started at the same time, the requested network bandwidth may exceed 1 Gb/s if the CPUs of the storage can handle the load created by the iSCSI traffic. This scenario is typical for shift-work companies. In such a case, set the Pool, Cloning, or Machine State option to Running, which always keeps the desktops running and therefore decouples the OS boot from the login of a user. Another option is to trunk several interfaces to provide more than 1 Gb/s bandwidth through one IP. You can also use Jumbo Frames to speed up iSCSI connections. Jumbo Frames need to be configured for all participants of the network: storage servers, Oracle VM VirtualBox servers, and switches. Note that Jumbo Frames are not standardized so there is a risk of incompatibilities.

Oracle VDI, in combination with Oracle VM VirtualBox, uses the Sparse Volume feature of ZFS, which enables it to allocate more **disk space** for volumes than is physically available as long as the actual data written does not exceed the capacity of the storage. This feature, in combination with the fact that cloned desktops reuse unchanged data of their templates, results in a very effective usage of the available disk space. Therefore, the calculation for disk space below is a worst-case scenario assuming that all volumes are completely used by data which differs from the template.

- **Number of cores** = number of virtual disks in use / 200

Example: A x7210 storage with 2 CPUs and 4 cores per CPU can serve up to $2 \times 4 \times 200 = 1600$ virtual disks

- **Memory size** - The more the better. The free memory can be used as a disk cache, which reduces the access time.

- **Number of disks** = number of desktops / 10

- **Average Network bandwidth [Mb/s]** = number of virtual disks in use * 0.032 Mb/s

Example: An x7210 storage with one Gigabit Ethernet interface can serve up to $1000 / 0.032 = 31250$ virtual disks

- **Peak Network bandwidth [Mb/s]** = number of virtual disks in use * 40 Mb/s

Example: An x7210 storage with one Gigabit Ethernet interface can serve up to $1000 / 40 = 25$ virtual disks

- **Disk space [GB]** = number of desktops * size of the virtual disk [GB]

Example: An x7210 storage with a capacity of 46 TB can support $46 * 1024 \text{ GB} / 2 / 8 \text{ GB} = 2944$ 8 GB disks in a RAID 10 configuration

**Note**

For details about how to improve desktop performance, see the sections on optimizing desktop images [Section 6.5, “Creating Desktop Images”](#).

8.4.2. About ZFS Storage Caches

This section provides a brief overview of the cache structure and performance of ZFS, and how it maps to the hardware of the Sun Storage 7000 series Unified Storage Systems.

Background

The Zettabyte File System (ZFS) is the underlying file system on the supported Solaris and Sun Storage 7000 series Unified Storage Systems storage platforms.

The Adaptive Replacement Cache (ARC) is the ZFS read cache in the main memory (DRAM).

The Second Level Adaptive Replacement Cache (L2ARC) is used to store read cache data outside of the main memory. Sun Storage 7000 series Unified Storage Systems use read-optimized SSDs (known as Readzillas) for the L2ARC. SSDs are slower than DRAM but still much faster than hard disks. The L2ARC allows for a very large cache which improves the read performance.

The ZFS Intent Log (ZIL) satisfies the POSIX requirements for synchronous writes and crash recovery. It is not used for asynchronous writes. The ZFS system calls are logged by the ZIL and contain sufficient information to play them back in the event of a system crash. Sun Storage 7000 series Unified Storage Systems use write-optimized SSDs (known as Writezillas or Logzillas) for the ZIL. If Logzillas are not available the hard disks are used.

The write cache is used to store data in volatile (not battery-backed) DRAM for faster writes. There are no system calls logged in the ZIL if the Sun Storage 7000 series Unified Storage Systems write cache is enabled.

Performance Considerations

Size the read cache to store as much data in it to improve performance. Maximize the ARC first (DRAM), then add L2ARC (Readzillas).

Oracle VDI enables the write cache by default for every iSCSI volume used by Oracle VDI. This configuration is very fast and does not make use of Logzillas, as the ZIL is not used. Without ZIL, data

might be at risk if the Sun Storage 7000 series Unified Storage System reboots or experiences a power loss while desktops are active. However, it does not cause corruption in ZFS itself.

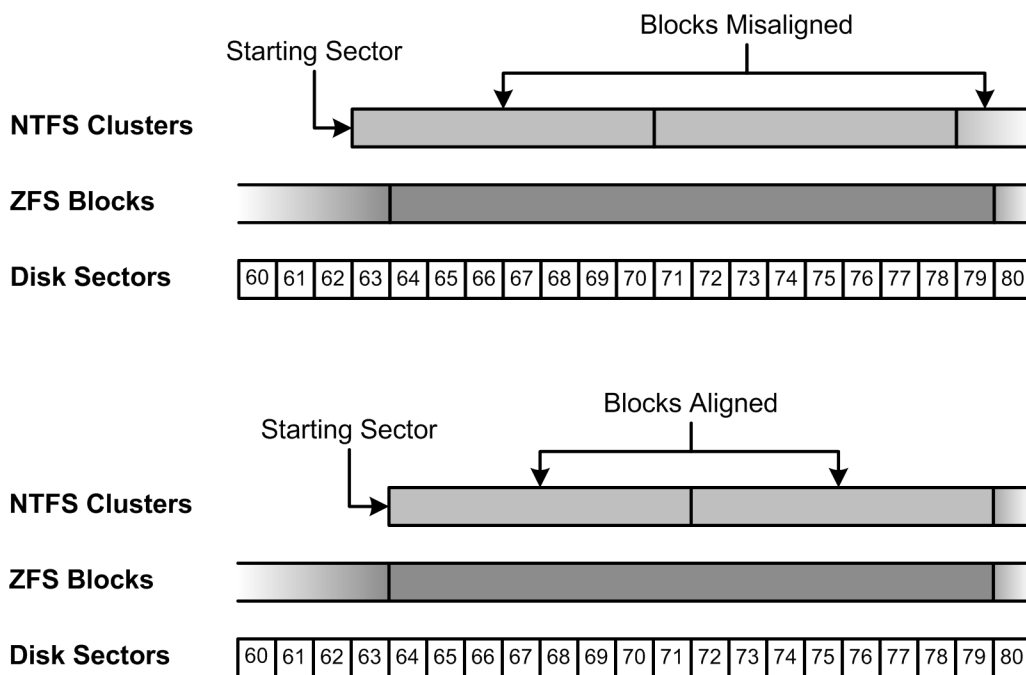
Disable the write cache in Oracle VDI to minimize the risk of data loss. Without Logzillas the ZIL is backed by the available hard disks and performance suffers noticeably. Use Logzillas to speed up the ZIL. In case you have two or four Logzillas use the 'striped' profile to further improve performance.

To switch off the in-memory write cache, select a storage in Oracle VDI Manager, click **Edit** to open the **Edit Storage** wizard and unselect the **Cache** check box. The change will be applied to *newly created* desktops for Oracle VDI Hypervisors and to *newly started* desktops for Microsoft Hyper-V virtualization platforms.

8.4.3. About Block Alignment

Classic hard disks have a block size of 512 bytes. Oracle Solaris and Sun Unified Storage use the ZFS file system, which has a default block size of 8 kilobytes. Depending on the guest operating system of the virtual machine, one logical block of the guest file system can use two ZFS blocks on the storage. This is known as block misalignment, as shown in [Figure 8.2, “Examples of Misaligned and Aligned Blocks”](#). It is best to avoid block misalignment because it doubles the IO on the storage to access a block of the guest OS file system (assuming a complete random access pattern and no caching).

Figure 8.2. Examples of Misaligned and Aligned Blocks



Windows XP is a particular example of where block misalignment can happen. Typically a single partition on a disk starts at disk sector 63. To check the alignment of a windows partition, use the following command:

```
wmic partition get StartingOffset, Name, Index
```

The following is an example of the output from this command:

Index	Name	StartingOffset
-------	------	----------------

```
0 Disk #0, Partition #0 32256
```

To find the starting sector, divide the StartingOffset value by 512:

$$32256 \div 512 = 63$$

An NTFS cluster is typically 4 kilobytes in size. So the first NTFS cluster starts at disk sector 63 and ends at disk sector 70. On the storage, the fourth ZFS block maps to disk sectors 48 to 63, and the fifth ZFS block sector maps to disk sectors 64 to 79. A misalignment occurs because both ZFS blocks must be accessed to access the first NTFS cluster, as shown in [Figure 8.2, “Examples of Misaligned and Aligned Blocks”](#).

For a correct block alignment, the StartingOffset value must be exactly divisible by 8192 (the default block size of the underlying ZFS storage).

In the following example, the blocks are misaligned:

```
wmic partition get StartingOffset, Name, Index
Index Name StartingOffset
0 Disk #0, Partition #0 32256
```

$$32256 \div 8192 = 3.97412109$$

In the following example, the blocks are aligned:

```
wmic partition get StartingOffset, Name, Index
Index Name StartingOffset
0 Disk #0, Partition #0 32768
```

$$32768 \div 8192 = 4$$

On Windows 2003 SP1 and later, the `diskpart.exe` utility has an Align option to specify the block alignment of partitions. For Windows XP, use a third-party disk partitioning tool such as `parted` to create partitions with a defined start sector, see the example that follows. For other operating systems, refer to your system documentation for details of how to align partitions.

Example of How to Prepare a Disk with Correct Block Alignment for Windows XP

In this example, the disk utilities on a bootable live Linux system, such as Knoppix, are used to create a disk partition with the blocks aligned correctly.

1. Create a new virtual machine.
2. Assign the ISO image of the live Linux system to the CD/DVD-ROM drive of the virtual machine.
3. Boot the virtual machine.
4. Open a command shell and become root.
5. Obtain the total number of sectors of the disk.

Use the `fdisk -ul` command to obtain information about the disk.

In the following example, the disk has 20971520 sectors:

```
# fdisk -ul
Disk /dev/sda doesn't contain a valid partition table
```

```
Disk /dev/sda: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders, total 20971520 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000
```

6. Create an MS-DOS partition table on the disk.

Use the `parted <disk> mklabel msdos` command to create the partition table.

In the following example, a partition table is created on the `/dev/sda` disk:

```
# parted /dev/sda mklabel msdos
```

7. Create a new partition, specifying the start and end sectors of the partition.

Use the `parted <disk> mkpartfs primary fat32 64s <end-sector>s` command to create the partition. The `<end-sector>` is the total number of sectors of the disk minus one. For example if the disk has 20971520 sectors, the `<end-sector>` is 20971519.

Depending on the version of `parted` used, you might see a warning that the partition is not properly aligned for best performance. You can safely ignore this warning.

In the following example, a partition is created on the `/dev/sda` disk:

```
# parted /dev/sda mkpartfs primary fat32 64s 20971519s
```

8. Check that the partition is created.

Use the `parted <disk> print` command to check the partition.

In the following example, the `/dev/sda` disk is checked for partitions:

```
# parted /dev/sda print
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 10.7GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos

Number  Start   End     Size    Type    File system  Flags
  1      32.8kB  10.7GB  10.7GB  primary fat32        lba
```

9. Shut down the virtual machine and unassign the ISO image.
10. Assign the Windows XP installation ISO image to the CD/DVD-ROM drive of the virtual machine.
11. Boot the virtual machine and install Windows XP.
12. When prompted, select the newly created partition.
13. (Optional) When prompted, change the file system from FAT32 to NTFS.
14. Complete the installation.
15. Log in to the Windows XP guest as an administrator.
16. Check that the StartingOffset is 32768.

```
wmic partition get StartingOffset, Name, Index
Index Name                StartingOffset
```

8.4.4. Oracle VDI Global Settings for Storage

This section provides information about the Oracle VDI global settings that apply to storage. Use the `vda settings-getprops` and `vda settings-setprops` commands to list and edit these settings.

Global Setting	Description
<code>storage.max.commands</code>	<p>The number of commands executed on a storage in parallel.</p> <p>The default is 25.</p> <p>Changing this setting requires a restart of the Oracle VDI service.</p> <p>The setting is global for an Oracle VDI installation and applies to a physical storage determined by its IP or DNS name.</p> <p>The number of Oracle VDI hosts does not influence the maximum number of parallel storage actions executed by Oracle VDI on a physical storage. Reduce the number in case of intermittent "unresponsive storage" messages to reduce the storage load. Doing so impacts cloning and recycling performance.</p> <p>This option works even if the Oracle VDI Center Agent is no longer running on the host.</p>
<code>storage.query.size.interval</code>	<p>The time in seconds the Oracle VDI service queries the storage for its total and available disk space.</p> <p>The default is 180 seconds.</p> <p>As there is only one Oracle VDI host which does this, there is typically no need to change this setting.</p>
<code>storage.watchdog.interval</code>	<p>The time in seconds the Oracle VDI service queries the storage for its availability.</p> <p>The default is 30 seconds.</p> <p>As there is only one Oracle VDI host which does this, there is typically no need to change this setting.</p>
<code>storage.fast.command.duration</code>	<p>The time in seconds after which the Oracle VDI service considers a fast storage command to have failed.</p> <p>The default is 75 seconds.</p> <p>Changing this setting requires a restart of the Oracle VDI service.</p> <p>The only Oracle VDI functionality which uses this command duration is the storage watchdog which periodically pings the storage for its availability.</p>

Global Setting	Description
<code>storage.medium.command.duration</code>	<p>The time in seconds after which the Oracle VDI service considers a medium storage command to have failed.</p> <p>The default is 1800 seconds (30 minutes).</p> <p>Changing this setting requires a restart of the Oracle VDI service.</p> <p>The majority of the storage commands used by Oracle VDI use this command duration.</p>
<code>storage.slow.command.duration</code>	<p>The time in seconds after which the Oracle VDI service considers a slow storage command to have failed.</p> <p>The default is 10800 seconds (3 hours).</p> <p>Changing this setting requires a restart of the Oracle VDI service.</p> <p>Only a few complex storage scripts used by Oracle VDI use this command duration. Such scripts are not run very often, typically once per day.</p>

The `storage.max.commands` setting is the setting that is most often changed. By default, Sun Storage 7000 series Unified Storage Systems can only execute four commands in parallel, and the remaining commands are queued. To achieve better performance, Oracle VDI intentionally overcommits the storage queue. If your storage becomes slow, for example because of a heavy load, it can take too long for queued commands to be executed, and if the commands take longer than the duration specified in the duration settings, the storage might be marked incorrectly as unresponsive. If this happens regularly, you can decrease the value of the `storage.max.commands` setting, but this might result in a decrease in performance when the storage is not so busy.

The interval settings rarely need to be changed because the commands are performed only by the primary host in an Oracle VDI Center. Decreasing the value of these settings results in more up-to-date information about the storage disk space and a quicker detection of unresponsive storage hosts, but also increases the load on the storage hosts. It is best to keep these settings at their defaults.

The duration settings include a good safety margin. Only change the duration settings if the storage is not able to execute the commands in the allotted time.

8.4.5. Managing the ZIL on Oracle Solaris Platforms

Disabling the ZFS Intent Log (ZIL) is a way to speed up Oracle Solaris 10 10/09 (and later) storage platforms. There are several ways to do it, but be aware that disabling ZIL is dangerous when synchronous disk I/O and data consistency during storage failures is important.

The command to immediately disable the ZIL:

```
echo zil_disable/W0t1 | mdb -kw
```

The command to immediately enable the ZIL:

```
echo zil_disable/W0t0 | mdb -kw
```


To prevent the `disable ZIL` command to survive a reboot, edit the `/etc/system` and add the following line.

```
set zfs:zil_disable=1
```

Changing the ZIL state is effective for a particular ZFS pool when it is mounted, so the ZFS pool must be created or remounted or imported after the setting was changed (which is implicitly done during reboot).

Since the ZIL setting is global for a storage and disables the ZIL for all ZFS pools of a storage after a reboot, a system's root volume served by ZFS might show undesired behavior because the synchronous semantics are gone.

The best practice to avoid such a conflict of interests is to use a server with at least two disks. The first disk hosts the system slices of the OS using the old UFS file system. The remaining disks are ZFS formatted and used as Oracle VDI storage. By doing this, the ZIL can be disabled and the UFS disk will still offer synchronous semantics since ZIL is ZFS only.

A reference page for ZFS and ZIL:

http://www.solarisinternals.com/wiki/index.php/ZFS_Evil_Tuning_Guide#Disabling_the_ZIL_.28Don.27t.29

8.5. Networking

The following is a list of the types of network traffic created by Oracle VDI. The list is ordered by bandwidth requirements, with highest bandwidth requirement listed first:

1. iSCSI traffic between Oracle VDI Hypervisor and Microsoft Hyper-V virtualization hosts and storage hosts
2. RDP traffic between Oracle VDI hosts and virtualization hosts
3. ALP traffic between Sun Ray Clients and Oracle VDI hosts
4. RDP traffic between the RDP clients and Oracle VDI hosts or virtualization hosts
5. Database replication traffic between the master and slave database hosts in an Oracle VDI Center, or between the primary Oracle VDI host and the external database, if an external database is used
6. SSH and HTTPS traffic between Oracle VDI hosts and storage hosts, or between Oracle VDI hosts and virtualization hosts

By default the SSH traffic used for storage management and the iSCSI traffic used for virtual disks use the same network interface. For reasons such as security considerations, routing requirements, or traffic shaping, you might want to configure the iSCSI traffic to use a separate network interface. See [Section 8.5.1, "How to Configure a Dedicated iSCSI Network"](#).

It is best practice to use link aggregation (also known as trunking or link bonding) for virtualization hosts and storage hosts. This results in a balanced use of the physical network interfaces, a better network throughput, as well as in the ability to keep an aggregated interface active if a physical interface goes down. To use link aggregation, you need a switch that supports the Link Aggregation Control Protocol (LACP). See [Section 8.5.2, "How to Configure Link Aggregation"](#)

VLANs provide a way to tag and isolate network traffic and can improve performance and security. See [Section 8.5.3, "How to Configure a VLAN"](#).

Link aggregation and VLANs can be used independently or together by tagging an aggregated link with a VLAN ID.

8.5.1. How to Configure a Dedicated iSCSI Network

You can use a dedicated iSCSI network to separate the storage management traffic from the iSCSI traffic used for virtual disks.

The dedicated iSCSI network interface must be configured before the first virtual disk is created on the storage host.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Desktop Providers**.
2. Select a desktop provider.
3. Go to the **Storage** tab.
4. Select a storage host and click **Edit**.

The Edit Storage wizard is displayed.

5. Complete the steps of the Edit Storage wizard until you reach the Select ZFS Pool step.
6. On the Select ZFS Pool step, select a different network from the **iSCSI Interface** list.
7. Click **Finish**.

CLI Steps

- Edit the network address interface to use for iSCSI.

```
/opt/SUNWvda/sbin/vda provider-storage-setprops --storage=<storage-host> \  
-p iscsi-interface=<interface-ip-address> <provider-name>
```

For example:

```
/opt/SUNWvda/sbin/vda provider-storage-setprops --storage=storage1.example.com \  
-p iscsi-interface=192.168.50.1 vbox1.example.com
```

8.5.2. How to Configure Link Aggregation

Link aggregation (also known as trunking or link bonding) is a mechanism for combining one or more network interfaces to provide better throughput and failover capabilities. To use link aggregation, you need a switch that supports the Link Aggregation Control Protocol (LACP). The following provides separate configuration examples for Oracle Solaris and Oracle Linux platforms.

Steps for Oracle Solaris Platforms

In the following steps, you aggregate devices e1000g0 and e1000g1. You can list the available devices on your system using the `dladm` command:

```
# dladm show-dev  
e1000g0 link: up speed: 1000 Mbps duplex: full  
e1000g1 link: up speed: 1000 Mbps duplex: full  
e1000g2 link: down speed: 0 Mbps duplex: half  
e1000g3 link: down speed: 0 Mbps duplex: half
```

Interfaces e1000g0 and e1000g1 are connected to ports 0 and 1 respectively on the switch.

For further information about link aggregation, refer to the documentation for your Oracle Solaris release.

1. Identify the switch ports that each network interface in the aggregation uses.

In this example, ports 0 and 1 are used.

2. Configure the switch to use aggregation (LACP) on ports 0 and 1.

Consult the switch's documentation for instructions on how to do this.

3. Create the aggregation.

Consult the [dladm](#) man page for more information on the parameters below. The policy (`-P L3`) must match the policy you configured for the switch ports. The last parameter, '1', indicates the aggregation key.

```
# dladm create-aggr -P L3 -l active -T short -d e1000g0 -d e1000g1 1
```

You can view the aggregated device with [dladm show-link](#) and [dladm show-aggr](#).

```
# dladm show-link
e1000g0 type: non-vlan mtu: 1500 device: e1000g0
e1000g1 type: non-vlan mtu: 1500 device: e1000g1
e1000g2 type: non-vlan mtu: 1500 device: e1000g2
e1000g3 type: non-vlan mtu: 1500 device: e1000g3
aggr1 type: non-vlan mtu: 1500 aggregation: key 1
#
# dladm show-aggr
key: 1 (0x0001) policy: L3 address: 0:14:4f:40:d2:4a (auto)
device address speed duplex link state
e1000g0 0:14:4f:40:d2:4a 0 Mbps half down standby
e1000g1 80:9c:4c:0:80:fe 0 Mbps half down standby
```

4. To make the device persistent, create a hostname file with the IP address assigned to the device, and reboot.

```
# echo "192.168.1.101" > /etc/hostname.aggr1
# reboot -- -r
```

5. After the system is rebooted, verify that the device is plumbed and available.

```
# ifconfig -a
```

6. If this is an existing Oracle VM VirtualBox host, refresh the networks in Oracle VDI Manager.

Navigate to the Oracle VDI desktop provider's **Network** tab and click **Refresh**.

If you have more than one network or subnet, ensure that the correct network is selected in the **Settings** tab for each pool.

Steps for Oracle Linux Platforms

In the following steps, you aggregate devices eth1 and eth2.

You can list the available devices on your system using the [ifconfig](#) command.

For further information about link aggregation, refer to the documentation for your Oracle Linux release.

Interfaces eth1 and eth2 are connected to ports 1 and 2 respectively on the switch.

1. Identify the switch ports that each network interface in the aggregation uses.

In this example, ports 1 and 2 are used.

2. Configure the switch to use aggregation (LACP) on ports 1 and 2.

Consult the switch's documentation for instructions on how to do this.

3. Create the aggregation.

Create a file `ifcfg-bond0` in `/etc/sysconfig/network-scripts` with the following content:

```
DEVICE=bond0
BOOTPROTO=none
ONBOOT=yes
IPADDR=<IP of the new aggregation>
NETMASK=<netmask of the new aggregation>
GATEWAY=<gateway of the new aggregation>
```

4. Configure the `eth1` and `eth2` interfaces to use the aggregation.

Edit the `ifcfg-eth1` configuration file so that it contains only the following lines:

```
DEVICE=eth1
BOOTPROTO=none
ONBOOT=yes
MASTER=bond0
SLAVE=yes
```

Edit the `ifcfg-eth2` configuration file so that it contains only the following lines:

```
DEVICE=eth2
BOOTPROTO=none
ONBOOT=yes
MASTER=bond0
SLAVE=yes
```

In the interface configuration file, you can just comment out lines that are not needed.

5. Set up the kernel module parameters for the aggregation.

Add the following lines to `/etc/modprobe.conf`:

```
alias bond0 bonding
options bond0 miimon=100 mode=balance-rr
```

This sets the balancing mode to round robin and checks the card every 100 milliseconds. For other options, refer to `/usr/share/doc/iputils-20020927/README.bonding`.

6. Restart the host.
7. Use the `ifconfig` command to check that the `bond0` interface is listed.
8. Check the bonding status.

```
cat /proc/net/bonding/bond0
```

9. If this is an existing Oracle VM VirtualBox host, refresh the networks in Oracle VDI Manager.

Navigate to the Oracle VDI desktop provider's **Network** tab and click **Refresh**.

If you have more than one network or subnet, ensure that the correct network is selected in the **Settings** tab for each pool.

8.5.3. How to Configure a VLAN

VLANs provide a way to tag and isolate network traffic and can improve performance and security. Either a physical network interface or a link aggregation can be tagged with a VLAN ID.

Steps for Oracle Solaris Platforms

Oracle Solaris currently supports the following interface types for VLANs: ce, bge, xge, e1000g.

For further information, refer to the documentation for your Oracle Solaris release.

1. Configure the switch ports used by the interfaces in the machine for the corresponding VLAN IDs (VIDs).

Consult your switch documentation for instructions on how to do this.

2. Calculate the physical point of attachment (PPA).

Each VLAN interface has a physical point of attachment (PPA) which needs to be calculated using the following formula: $\text{driver-name} + \text{VID} * 1000 + \text{device-instance}$.

To calculate the PPA for e1000g0:

```
driver-name = e1000g
VID = 123
device-instance = 0

e1000g + 123 * 1000 + 0 = e1000g123000
```

To calculate the PPA for aggr1:

```
driver-name = aggr
VID = 123
device-instance = 1

aggr + 123 * 1000 + 1 = aggr123001
```

3. With the PPA at hand, plumb the interface.

```
# ifconfig e1000g123000 plumb 192.168.1.101 up
```

4. Make the changes persistent.

```
# echo "192.168.1.101" > /etc/hostname.e1000g123000
# ifconfig -a
```

5. If this is an existing Oracle VM VirtualBox host, refresh the networks in Oracle VDI Manager.

Navigate to the Oracle VDI desktop provider's **Network** tab and click **Refresh**.

If you have more than one network/subnet ensure that the correct network is selected in the **Settings** tab for each pool.

Steps for Oracle Linux Platforms

In the following example VLAN ID (VID) 3 is used with the physical interface eth0.

1. Configure the switch ports used by the interfaces in the machine for the corresponding VIDs.

Consult your switch documentation for instructions on doing this.

2. Create the new VLAN interface.

```
DEVICE=eth0.3
BOOTPROTO=static
ONBOOT=yes
IPADDR=<IP of the new VLAN interface>
NETMASK=<netmask of the VLAN interface>
VLAN=yes
```

3. Bring up the new interface.

```
# ifup eth0.3
```

4. Use the `ifconfig` command to check that the `eth0.3` interface is listed.
5. If this is an existing Oracle VM VirtualBox host, refresh the networks in Oracle VDI Manager.

Navigate to the Oracle VDI desktop provider's **Network** tab and click **Refresh**.

If you have more than one network/subnet ensure that the correct network is selected in the **Settings** tab for each pool.

8.6. Virtual Machines

8.6.1. How to Configure Desktop Resources Per Pool (Oracle VDI Provider)

With Oracle VDI, you can configure Desktop Resource settings for all desktops within a specific pool. The settings only apply to pools that use an Oracle VDI desktop provider.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Pools**.
2. Select a pool.
3. Go to the Settings tab.
4. In the Desktop Resources section, configure the resource settings.
See [Section 8.6.1.1, "Available Desktop Resource Settings"](#) for details of the available settings.
5. Click Save.

CLI Steps

1. Configure the Desktop Resource settings.

See [Section 8.6.1.1, "Available Desktop Resource Settings"](#) for details of the available settings.

```
# /opt/SUNWvda/sbin/vda pool-setprops \
-p prop1=value1, prop2=value2 pool name
```

In the following example, the CPU usage is set to 70% for the pool named MyPool.

```
# /opt/SUNWvda/sbin/vda pool-setprops -p cpu-cap=70 MyPool
```

2. Check the Desktop Resource settings.

```
# /opt/SUNWvda/sbin/vda pool-getprops -p cpu-cap pool name
CPU Execution Cap: 70
```

8.6.1.1. Available Desktop Resource Settings

The following table lists the Desktop Resource settings available to pools that use an Oracle VDI desktop provider. The settings apply to all desktops in the pool.

Setting	CLI Property	Description	Default
CPU Usage	<code>cpu-cap</code>	Controls how much CPU time a virtual CPU can use, expressed as a percentage. A value of 50 means a single Virtual CPU can use up to 50% of a single host CPU.	100
Memory Sharing	<code>memory-sharing</code>	Controls the amount of memory shared between desktops, expressed as a percentage between 0 and 75. For more information, see Section 5.1.1, "About the Oracle VDI Hypervisor" .	0
Memory Paging	<code>memory-paging</code>	Controls whether or not memory paging is used for similar running virtual machines. For more information, see Section 5.1.1, "About the Oracle VDI Hypervisor" .	Disabled
Asynchronous Disk I/O	<code>async-io</code>	Enables or disables asynchronous disk I/O. This feature is not supported by IDE controllers.	Enabled
Limited Data Rate	Enabled if Maximum Data Rate is set	Enable or disable the ability to limit bandwidth.	Disabled
Maximum Data Rate	<code>bandwidth-ctl</code>	Limit the maximum bandwidth used for asynchronous I/O, expressed as megabytes per second (MB/s). The Limited Data Rate setting must be enabled	50

8.6.2. Optimizing Windows 7 Desktop Images

Block Alignment

The alignment of the blocks on the virtual disk can have a significant impact on the performance of the storage. See [Section 8.4.3, "About Block Alignment"](#) for details of how to correct the block alignment.

Cloning Preparation for Oracle VM VirtualBox and Microsoft Hyper-V

[Oracle VDI Fast Preparation \(FastPrep\)](#) and [Windows System Preparation \(Sysprep\)](#) enable cloning of Windows desktops by Oracle VDI. 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 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, see "Security and Services" in [Section 8.6.2, "Optimizing Windows 7 Desktop Images"](#).
- 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.

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**.

2. Set a plain desktop background.

- a. Select **Desktop Background** from the **Personalization** menu.
- b. Select **Solid Colors** in the **Picture Location** menu.

3. Configure the screen saver.

If you want to use the Oracle VM VirtualBox Auto-Logon feature, disable the screen saver. Otherwise, set a blank screen saver with password protect on resume.

- a. Select **Screen Saver** from the **Personalization** menu.
- b. Either set the screen saver to **[None]** to disable it, or set the screen saver to **Blank** and select **On resume, display logon screen**.

4. Disable Windows sounds.

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

5. (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)**.

6. Save your settings as a Theme.

- a. Select **Save theme** from the **Personalization** menu.
- b. Choose a name for the theme.

7. Go to the **Display** menu.

Select **Start, Control Panel, Appearance and Personalization**, then **Display**.

8. 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**.
2. 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 the **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**.
3. Install Windows updates.
 - a. Select **Windows Update** from the **System and Security** menu.
 - b. Select **Check for updates**, then **Install updates**.
4. (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**.
5. 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**.
6. 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**.
7. 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 Optimizations

- 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.

8.6.3. Optimizing Windows Vista Desktop Images

Block Alignment

The alignment of the blocks on the virtual disk can have a significant impact on the performance of the storage. See [Section 8.4.3, "About Block Alignment"](#) for details of how to correct the block alignment.

Cloning Preparation for Oracle VM VirtualBox and Microsoft Hyper-V

[Oracle VDI Fast Preparation \(FastPrep\)](#) and [Windows System Preparation \(Sysprep\)](#) enable cloning of Windows desktops by Oracle VDI. Oracle VDI FastPrep can be configured within a pool without any desktop preparation.

Before enabling Windows System Preparation for a pool that uses Microsoft Hyper-V as the desktop provider, 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 in your template.

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**.

2. Set a plain desktop background.
 - a. Select **Desktop Background** from the **Personalization** menu.
 - b. Select **Solid Colors** in the **Picture Location** menu.
3. Configure the screen saver.

If you want to use the Oracle VM VirtualBox Auto-Logon feature, disable the screen saver. Otherwise, set a blank screen saver with password protect on resume.

- a. Select **Screen Saver** from the **Personalization** menu.
 - b. Either set the screen saver to **[None]** to disable it, or set the screen saver to **Blank** and select **On resume, display logon screen**.
4. Disable Windows sounds.
 - a. Select **Sounds** from the **Personalization** menu.
 - b. On the **Sounds** tab, select **No Sounds** under **Sound Scheme**.
 5. (VRDP Only) Change mouse pointers.
 - a. Select **Mouse Pointers** from the **Personalization** menu.
 - b. In the **Scheme** menu, select **Windows Black (system scheme)**.
 6. 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.
 7. 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**.
2. 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**.
3. (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**.
4. 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**.
5. 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**.
6. 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 Optimizations

- 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.

8.6.4. Optimizing Windows XP Desktop Images

Block Alignment

The alignment of the blocks on the virtual disk can have a significant impact on the performance of the storage. See [Section 8.4.3, "About Block Alignment"](#) for details of how to correct the block alignment.

Cloning Preparation for Oracle VM VirtualBox and Microsoft Hyper-V

[Oracle VDI Fast Preparation \(FastPrep\)](#) and [Windows System Preparation \(Sysprep\)](#) enable cloning of Windows desktops by Oracle VDI. 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: <http://www.microsoft.com/downloads/details.aspx?FamilyId=3E90DC91-AC56-4665-949B-BEDA3080E0F6&displaylang=en>
 - Windows XP Service Pack 3 Deployment Tools: <http://www.microsoft.com/downloads/details.aspx?FamilyID=673a1019-8e3e-4be0-ac31-70dd21b5afa7&displaylang=en>
- 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.

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**.

2. Set a plain desktop background.

- a. Select the **Display** tab from the **Display Properties** menu.
- b. Under **Background**, select **None**.
- c. Select **Apply**.

3. Configure the screen saver.

If you want to use the Oracle VM VirtualBox Auto-Logon feature, disable the screen saver. Otherwise, set a blank screen saver with password protect on resume.

- a. Select **Screen Saver** from the **Display Properties** menu.
- b. Either set the screen saver to **[None]** to disable it, or set the screen saver to **Blank** and select **On resume, display logon screen**.
- c. Select **Apply**.

4. 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**.
5. 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**.
2. 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**.
3. (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**.
4. 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.
5. 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**.
6. 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 Optimizations

- Turn off automatic defragmentation.
 1. Select **Start**, then **Run**.
 2. Type 'regedit' and click **OK**.
 3. In the registry editor, go to [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\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**.

8.6.5. Optimizing Desktop Images for Other Operating Systems

The following are some basic guidelines for optimizing desktop performance for other operating systems:

- The alignment of the blocks on the virtual disk can have a significant impact on the performance of the storage. See [Section 8.4.3, "About Block Alignment"](#) for details of how to correct the block alignment.
- 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.

Chapter 9. Monitoring and Maintaining Oracle VDI

Table of Contents

9.1. How to Log in to Oracle VDI Manager	183
9.2. Oracle VDI Administrators	184
9.2.1. About Oracle VDI Role-Based Administration	184
9.2.2. How to Create Administrators and Assign Roles	186
9.3. Checking Oracle VDI Services and Logs	187
9.3.1. How to Check the Status of the Oracle VDI Center	187
9.3.2. How to Check the Oracle VDI Log Files	187
9.3.3. How to Change Logging for Oracle VDI	187
9.3.4. How to Check the Status of the Oracle VDI Database	189
9.3.5. How to Check the Status of the Oracle VDI Service	189
9.3.6. How to Check the Status of the Oracle VDI RDP Broker	190
9.3.7. How to Check the Status of the Oracle VDI Center Agent	190
9.3.8. How to Check the Status of the Oracle VDI Manager	190
9.3.9. How to Check the Status of Cacao and the Oracle VDI Modules	191
9.3.10. How to Restart Cacao	192
9.4. Backing Up and Restoring the Oracle VDI Database	192
9.5. About Desktop Provider Alarms	193
9.6. Maintenance Mode	194
9.6.1. Oracle VDI Hypervisor and Microsoft Hyper-V Host Maintenance	194
9.6.2. Storage Maintenance	195
9.7. Deleting Orphan Disks	196
9.8. Oracle VDI Centers and Failover	197
9.8.1. How to Change the Replication Database Host	197
9.8.2. How to Change the Primary Host in an Oracle VDI Center	198
9.8.3. How to Trigger Failover Manually	198
9.8.4. How to Remove an Unresponsive Host from an Oracle VDI Center	198
9.8.5. How to Tune Automatic Failover	199
9.9. Providing Feedback and Reporting Problems	200
9.9.1. Contacting Oracle Specialist Support	200
9.9.2. Support Bundles	200

9.1. How to Log in to Oracle VDI Manager

The following are the supported client platforms and browsers for Oracle VDI Manager:

Client Operating System	Supported Browsers
Microsoft Windows	Firefox 3.6
	Internet Explorer 8
Oracle Solaris	Firefox 3.6
Linux	Firefox 3.6

1. Using a browser, go to <https://<server-name>:1800>

If you enter an <http://> URL, you are redirected to the <https://> URL.

The browser displays a security warning and prompts you to accept the security certificate.

2. Accept the security certificate.

A login page is displayed.

3. Log in as an administrator.

By default, the root user on the host is an administrator.

Log in with the user name `root` and root's password.

For more information on administrators, see [Section 9.2, "Oracle VDI Administrators"](#).

9.2. Oracle VDI Administrators

9.2.1. About Oracle VDI Role-Based Administration

Oracle VDI administrators can be any valid user on an Oracle VDI host. They are identified by their login name. To be able to administer Oracle VDI from any host in an Oracle VDI Center, the user account must exist on all hosts. Otherwise a user can only administer Oracle VDI on the hosts on which they have a user account.

By default, the root user is the only administrator on an Oracle VDI host. Other users can be granted administrative privileges. Oracle VDI uses role-based access control to restrict system access to the two main administrative areas, Companies and Desktop Providers. There are predefined roles to which administrators can be assigned to perform a job function.

There are three types of role:

- Administrator : This type has full read and write access to an area.
- Operator : This type has limited access to an area.
- Monitor : This type has read-only access to an area.

There are six roles available in Oracle VDI:

- Primary Administrator

This role has full access to Oracle VDI. It can create, edit, and remove companies. The role inherits the Company Administrator and Desktop Provider Administrator roles.

- Company Administrator

This role can create and delete pools. It provides full access to the template management. The role inherits the Company Operator role.

- Company Operator

This role can edit pool settings and assign users to pools. It provides full access to the desktops. The role inherits the Company Monitor role.

- Company Monitor

This role can view all details in the Users and Pools area.

- Desktop Provider Administrator

This role can create, edit and delete desktop providers, and edit all settings. The role inherits the Desktop Provider Monitor role.

- Desktop Provider Monitor

This role can view all details in the Desktop Provider area.

The root user is always a Primary Administrator. This user cannot change role or be deleted from the list of administrators.

An administrator can be assigned more than one role but there are restrictions on the combinations. An administrator can have only one of the following:

- Primary Administrator role
- One Company role
- One Desktop Provider role
- One Company role *and* one Desktop Provider role

Role-Based Administration in Oracle VDI Manager

The appearance of Oracle VDI Manager is restricted depending on the roles assigned to the administrator. The top-level categories are shown only if the administrator has the required viewing rights for that category, as follows:

- The Users and Pools areas are shown to Company roles and the Primary Administrator role.
- The Desktop Provider area is shown to Desktop Provider roles and the Primary Administrator role.
- The Settings area is shown to the Primary Administrator role.

Cross-area links are disabled, if the administrator does not have the required viewing rights for the target area of the link.

Within an area, the appearance of Oracle VDI Manager is not changed depending on the roles assigned to the administrator. All buttons or action items appear active. When an administrator attempts to perform the operation that is not permitted, the operation fails and the following message is displayed:

You do not have sufficient administration rights to perform this operation.

Role-Based Administration on the Command Line

The `vda` command can be run by root and non-root users. All other Oracle VDI commands must be run by root.

Every time a non-root user runs a `vda` command, they are prompted to provide a password.

To run a `vda` command with an identity other than the current user, set the `VDA_USERNAME` environment variable to the required user name. When you run a command in this way, you enter the password of the `VDA_USERNAME` user.

If the administrator does not have the permission to run a `vda` subcommand, the command fails and the following message is displayed:

You do not have sufficient administration rights to perform this operation.

Role-Based Administration and Oracle VDI Web Services

Role-Based administration applies to Oracle VDI web services. A

`com.sun.vda.service.api.ServiceException` is thrown if the credentials provided do not have the permissions to perform the requested operation.

9.2.2. How to Create Administrators and Assign Roles

To assign an administrator to a role, the administrator must be a valid user on the Oracle VDI host.

For more information about administrators and roles, see [Section 9.2.1, “About Oracle VDI Role-Based Administration”](#).

Using Oracle VDI Manager, a Primary Administrator cannot edit their own role assignment, or remove their own user name from the list of administrators. These tasks must be performed by another Primary Administrator.

Oracle VDI Manager Steps

1. Log in to Oracle VDI Manager as a Primary Administrator.

Only a Primary Administrator can assign administration privileges. By default, the root user is a Primary Administrator.

2. Go to Settings → VDI Center.
3. Go to the Administrator tab.

A list of configured administrators and their roles is displayed.

4. Add an administrator.
 - a. Click the New button.
 - b. Type the login name of the administrator.
 - c. Click OK.

The new administrator is added to the list and is assigned the Company Monitor role by default.

5. (Optional) Edit the role assignments for an administrator.
 - a. In the list of administrators, click the administrator user name.

The Role Assignment list is displayed.

- b. Select the check box for the role(s) you want to assign to the administrator and click the Save button.
- c. Click the Save button.

A message is displayed that confirms the role assignments are updated.

CLI Steps

1. On an Oracle VDI host and log in as a Primary Administrator.

Only a Primary Administrator can assign administration privileges. By default, the root user is a Primary Administrator.

2. Check whether the user is an administrator.

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

3. List the available roles.

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

4. Assign roles to an administrator.

```
# /opt/SUNWvda/sbin/vda admin-assign -r <role>,<role>... <username>
```

For example:

```
# /opt/SUNWvda/sbin/vda admin-assign -r company.monitor,provider.operator jsmith
```

9.3. Checking Oracle VDI Services and Logs

This section describes how to check the status of the various services provided by Oracle VDI and how to check the log files for troubleshooting purposes. On Oracle Solaris platforms, some services also run under the control of the Service Management Facility (SMF).

The Oracle VDI Service and Center Agent run as modules in the Common Agent Container (Cacao). If you encounter any issues, check the status of Cacao and the modules, as well as the status of the Oracle VDI services.

9.3.1. How to Check the Status of the Oracle VDI Center

Use the `vda-center status` command to check the status of an Oracle VDI Center. This command obtains information from the individual hosts in the Oracle VDI Center. For each host, the status of the host, the database role of the host (if the embedded MySQL database is used), and the status of the Oracle VDI Center service is shown.

- Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center status
```

For example:

```
# /opt/SUNWvda/sbin/vda-center status
HOST NAME                HOST STATUS  SERVICE                SERVICE STATUS
primary.example.com      Up           VDI Database Replication Up
secondary.example.com    Up           VDI Database           Up

2 host(s) in center.
```

In case of problems, check the log files for messages beginning `com.sun.vda.cluster`, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

9.3.2. How to Check the Oracle VDI Log Files

Events for Oracle VDI events are logged in the Cacao log files in the following locations:

- Oracle Solaris platforms: `/var/cacao/instances/vda/logs/cacao.0`
- Oracle Linux platforms: `/var/opt/sun/cacao2/instances/vda/logs/cacao.0`

Log messages at SEVERE or WARNING level are also forwarded to the `syslog` daemon.

9.3.3. How to Change Logging for Oracle VDI

By default, all Oracle VDI events are logged in the Cacao log files. The default maximum log file size is 95 megabytes. When the limit is reached, the current log file is closed and a new one created. By default, Oracle VDI retains ten log files. You can change the logging level, the number of log files, and the log file size limit.

Changing the Logging Level

1. Display a list of the available log filter levels.

Run the following command as root:

```
# cacoadm list-filters -l -i vda
```

On Linux platforms, the `cacoadm` command is in `/opt/sun/cacao2/bin`.

The logging levels are from SEVERE (shows the least detail) to FINEST (shows the most detail).

2. Change the logging level.

Run the following command as root:

```
# cacoadm set-filter -p com.sun.vda.service=<log-level> -i vda
```

For example, to decrease the logging level to log informational messages:

```
# cacoadm set-filter -p com.sun.vda.service=INFO -i vda
```

For example, to reset the logging level to the default for the Oracle VDI service:

```
# cacoadm set-filter -p com.sun.vda.service=ALL -i vda
```

3. Restart Cacao.

After changing the logging level, you must restart Cacao for the change to take effect.

Run the following command as root:

```
# cacoadm stop -f -i vda
# cacoadm start -i vda
```

Changing the Log History and Log File Size

1. Stop Cacao.

Run the following command as root:

```
# cacoadm stop -f -i vda
```

2. Change the number of log files Oracle VDI retains.

Run the following command as root:

```
# cacoadm set-param log-file-count=<num> -i vda
```

where `<num>` is the number of log files to retain. The default is 10.

3. Change the log file size limit.

Run the following command as root:

```
# cacoadm set-param log-file-limit=<size> -i vda
```

where `<size>` is the maximum size of the log files in bytes. The default is 100000000. The maximum allowed is 2147483647.

4. Check that the configuration changes have taken effect.

Run the following command as root:

```
# cacaoadm list-params -i vda
```

5. Restart Cacao.

Run the following command as root:

```
# cacaoadm start -i vda
```

9.3.4. How to Check the Status of the Oracle VDI Database

With Oracle VDI, you can use the embedded MySQL database, or connect to your own remote MySQL database. Use the `vda-db-status` command to check the status of either database type.

- Run the following command as root.

```
# /opt/SUNWvda/sbin/vda-db-status
```

For example:

```
# /opt/SUNWvda/sbin/vda-db-status
Ip/Hostname Database host      Role    Status
-----
primary.example.com           Master  up
secondary.example.com         Slave   up
```

In case of problems, check the log file at `/var/svc/log/application-database-vdadb:default.log`.

On Oracle Solaris platforms, you can also check the status of the Oracle VDI database using the Service Management Facility. This only checks the status of the database on the local host and is only available if you are using the embedded MySQL Server database. The master database runs on the primary host. The slave database service runs in the first secondary host added to the Oracle VDI Center.

On the primary host or the first secondary host, run the following command as root.

```
# svcs svc:/application/database/vdadb:default
```

For example:

```
# svcs svc:/application/database/vdadb:default
STATE      STIME    FMRI
online     Sep_30   svc:/application/database/vdadb:default
```

9.3.5. How to Check the Status of the Oracle VDI Service

Use the `vda-service status` command to show whether the Cacao management daemon is enabled or disabled, its process numbers, and its uptime.

- Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-service status
```

For example:

```
# /opt/SUNWvda/sbin/vda-service status
vda instance is ENABLED at system startup.
```

```
Smf monitoring process:
11761
11762
Uptime: 2 day(s), 23:22
```

In case of problems, check the log files, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

9.3.6. How to Check the Status of the Oracle VDI RDP Broker

Use the `brokeradm status` command to check if the Oracle VDI RDP broker and proxy services are running.

- Run the following command as root.

```
# /opt/SUNWvda-rdpb/bin/brokeradm status
```

For example:

```
# /opt/SUNWvda-rdpb/bin/brokeradm status
broker is running (PID 18204)
proxy is running (PID 18223)
```

In case of problems, check the log files at `/var/svc/log/application-rdpb-broker:default.log` and `/var/svc/log/application-rdpb-proxy:default.log`.

On Oracle Solaris platforms, the RDP broker and proxy services also run under the Service Management Facility. Run the following commands as root.

```
# svcsvcs svc:/application/rdpb-broker:default
# svcsvcs svc:/application/rdpb-proxy:default
```

For example:

```
# svcsvcs svc:/application/rdpb-broker:default svc:/application/rdpb-proxy:default
STATE          STIME      FMRI
online         Sep_30     svc:/application/rdpb-broker:default
online         Sep_30     svc:/application/rdpb-proxy:default
```

9.3.7. How to Check the Status of the Oracle VDI Center Agent

Use the `vda-center agent-status` command to check whether the Oracle VDI Center Agent is running (and for how long) and to display the MD5 fingerprint of the host's SSL certificate.

- Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center agent-status
```

For example:

```
# /opt/SUNWvda/sbin/vda-center agent-status
Agent is up for 2 day(s), 23:32.
MD5 fingerprint is 07:A0:6C:4C:1D:5F:5B:20:A0:2A:FE:EA:1F:DB:B2:24.
```

In case of problems, check the log files for messages beginning `com.sun.vda.cluster`, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

9.3.8. How to Check the Status of the Oracle VDI Manager

Use the `vda-webserver status` command to check whether the Oracle VDI Manager is running.

- Run the following command as root.

```
# /opt/SUNWvda/sbin/vda-webserver status
```

For example:

```
# /opt/SUNWvda/sbin/vda-webserver status
Oracle Virtual Desktop Infrastructure Manager is running (pid 18106).
```

In case of problems, check the log file at `/var/opt/SUNWvda/log/webserver0.log`.

9.3.9. How to Check the Status of Cacao and the Oracle VDI Modules

You use the `cacoadm` command to check the status of Cacao and the individual Oracle VDI modules. On Oracle Solaris platforms, Cacao is included with the operating system. On Oracle Linux platforms, Cacao is installed as part of Oracle VDI. On Oracle Linux platforms, the `cacoadm` command is in `/opt/sun/cacao2/bin`.

When you check the status of Cacao, the command shows whether the Cacao management daemon is enabled or disabled, its associated process numbers, and its uptime.

When you check the status of the individual modules, the commands report the following information about the module:

- **Operational State:** either `ENABLED` (the module is able to offer service) or `DISABLED` (the module is unable to offer service). The `DISABLED` state indicates that Cacao has detected an error for the module and the module is not operational.
- **Administrative State:** either `LOCKED` (the module must not offer service) or `UNLOCKED` (the module must offer service).
- **Availability Status:** the availability status is empty unless the operational state is set to `DISABLED`. If this is the case, the values are either `DEPENDENCY` (the module cannot operate because another resource on which it depends is unavailable), `OFF_LINE` (a routine operation is needed to bring the module back into use), or `FAILED` (the module has an internal fault that prevents it from operating).

In case of problems, check the log files, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

How to Check the Status of Cacao

- Run the following command as root.

```
# cacoadm status -i vda
```

For example:

```
# cacoadm status -i vda
vda instance is ENABLED at system startup.
Smf monitoring process:
11761
11762
Uptime: 2 day(s), 23:22
```

The `vda-service status` command shows the same information, see [Section 9.3.5, “How to Check the Status of the Oracle VDI Service”](#).

Alternatively, use the Oracle Solaris Service Management Facility.

```
# svcs svc:/application/management/common-agent-container-1:vda
```

How to Check the Status of the Oracle VDI Service Module

- Run the following command as root.

```
# cacaoadm status -i vda com.sun.vda.service
```

For example:

```
# cacaoadm status -i vda com.sun.vda.service
Operational State:ENABLED
Administrative State:UNLOCKED
Availability Status:[]
Module is in good health.
```

How to Check the Status of the Oracle VDI Service Center Agent Module

- Run the following command as root.

```
# cacaoadm status -i vda com.sun.vda.center
```

For example:

```
# cacaoadm status -i vda com.sun.vda.center
Operational State:ENABLED
Administrative State:UNLOCKED
Availability Status:[]
Module is in good health.
```

9.3.10. How to Restart Cacao

- Run the following command as root.

```
# cacaoadm stop -f -i vda
# cacaoadm start -i vda
```

On Linux platforms, the `cacaoadm` command is in `/opt/sun/cacao2/bin`.

9.4. Backing Up and Restoring the Oracle VDI Database

As with all user-level data, it is important to back up the Oracle VDI database periodically. This is also a crucial step if you plan to reinstall an Oracle VDI host.

The following information should be used when backing up data for both the embedded MySQL database and a remote MySQL database. To learn more about Oracle VDI configurations and the corresponding databases, refer to [Section 3.1, “About Oracle VDI Centers and Hosts”](#).

This backup task archives only the content of the Oracle VDI database. The volumes of desktops and templates as well as configuration and settings values **are not backed up**.

Before You Begin

Here is a list of important notes when backing up and restoring the Oracle VDI database.

- For multi-host setups, the backup and restore process should only be done on one host. It does not need to be done on every host.
- You can perform the backup and restore tasks on different hosts as long as the archived backup is accessible.

- The backup job stops all other Oracle VDI jobs. Jobs are automatically started again after the backup finishes.
- The restore job stops the entire Oracle VDI system, but active sessions will continue to run. When a restore job finishes, you must restart the Oracle VDI system (through the Common Agent Container (cacao) on all hosts.

Steps

1. Make a backup of the database.

- From the CLI, run the `vda-backup` command.

```
# /opt/SUNWvda/sbin/vda-backup [-p <path-to-directory>] [-o <output-file-name>]
```

While the backup job is running, all other jobs are stopped or put in queue in all hosts. A zip archive is created, that includes one file, with an `.db` extension and a timestamp-based name.

For a detailed view of the `backup` command syntax use the following command.

```
# /opt/SUNWvda/sbin/vda-backup -h
```

- From Oracle VDI Manager:
 - a. Select the **Settings** category, then the **VDI Center** subcategory.
 - b. Select the **Database** tab, and click **Backup** in the **VDI Database Backup** section.

2. Restore the backed up database on the new Oracle VDI installation.

- From the CLI, run the `vda-restore` command.

```
# /opt/SUNWvda/sbin/vda-restore -i <path-to-backup.zip>
```

For a detailed view of the `vda-restore` command syntax use the following command.

```
# /opt/SUNWvda/sbin/vda-restore -h
```

3. After the restore job finishes, restart Oracle VDI system on all hosts.

```
# cacoadm stop -f -i vda
# cacoadm start -i vda
```

On Linux platforms, the `cacoadm` command is in `/opt/sun/cacao2/bin`.

9.5. About Desktop Provider Alarms

The status of desktop provider alarms is displayed at the top of Oracle VDI Manager underneath 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 Oracle 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.

9.6. Maintenance Mode

On occasion, you might need to off-line a configured host or storage, including maintenance, upgrades, and decommissioning. The Maintenance Mode feature allows virtual machines to be cleared from a currently used host or storage and moved to a different host or storage so that normal operations may continue while the initial host or storage is unavailable. This process is also considered a "cold" migration because running virtual machines will be suspended to allow the maintenance process to proceed.

Maintenance mode is available for Oracle VDI and Microsoft Hyper-V desktop providers **only**.

9.6.1. Oracle VDI Hypervisor and Microsoft Hyper-V Host Maintenance

The two ways a host can be put in maintenance mode are:

Migrate Desktops or Shutdown and Restart Desktops on Another Host

- Requires > 1 Oracle VM VirtualBox host.
- Migrate Desktops - Offered only if the Oracle VDI thinks there are other compatible hosts. Otherwise, "Shutdown and Restart Desktops" is offered.
- Desktops are migrated one after the other. A desktop being migrated will be temporarily unavailable for up to a minute.

Suspend Desktops on a Host

- Always offered.
- Suspends all desktops on the current host.
- If a suspended desktop is requested it will be resumed on another Oracle VM VirtualBox host, if available.



Note

A compatible Oracle VM VirtualBox host must have identical, or very similar, CPU models. Attempting to resume a desktop on a different CPU model will often result in a failure. The Oracle VDI verifies that hosts have the correct CPU manufacturer. The administrator is responsible for ensuring that the CPU models are compatible.

Desktop providers with a single Oracle VM VirtualBox or Microsoft Hyper-V host will be able to suspend all running desktops associated with the specified host.

Desktop providers with more than one Oracle VM VirtualBox host allow running desktops to be migrated to other enabled hosts. Depending on host compatibility one of two migration options will be available. If

Oracle VDI detects other compatible hosts, it will attempt to migrate each desktop by suspending it and resuming it on another host. If no compatible hosts are detected, Oracle VDI will attempt to shutdown and restart the desktops on other hosts. A compatible Oracle VM VirtualBox host must have identical, or very similar, CPU models. Oracle VDI verifies that hosts have the correct CPU manufacturer. The administrator is responsible for ensuring that the CPU models are compatible. Oracle VDI also checks for valid Oracle VM VirtualBox releases.

With Microsoft Hyper-V, the desktops cannot not be migrated to another host. They are suspended and will be restarted on the same host. In the event that the disk number associated with a desktop has changed during the host maintenance period (this may happen if the Hyper-V host is rebooted), Oracle VDI will power off the desktop before it can be restarted, causing any suspend data to be lost.

In Oracle VDI Manager:

1. Select the **Desktop Providers** category, and click the desktop provider containing the host you would like to suspend.
2. Select the **Host** tab, select the host to migrate and click the **Maintenance** button.

A pop-up window will appear with two options depending on host compatibility.

- a. Choose maintenance type.
 - If you will be moving the desktops to a different host, select the **Migrate Desktops** option.
 - If you will be suspending all desktops on the host, select the **Suspend Desktops** option.
- b. Choose a time for the server to begin entering maintenance or click **Now** to select the current time.
- c. Click **OK** to submit the maintenance mode job.

9.6.2. Storage Maintenance

Oracle VDI provides a mechanism to put one or more storage servers in maintenance mode. Maintenance mode implies that the storage server is disabled and all running desktops are either shutdown or suspended. Desktops will be unavailable until the storage server is re-enabled. At this point, maintenance can take place on the storage server (rebooting, upgrading). No data is moved or deleted from the specified storage server (including desktop hard disk data). When the storage server is re-enabled, any desktops suspended as a result of entering maintenance mode will be resumed.

When putting a Hyper-V host or storage into maintenance mode, all desktops must be powered off.

In Oracle VDI, you can clear or suspend running desktops on virtualization hosts and storage servers. Maintenance mode allows administrators to perform typical maintenance tasks on servers (rebooting, upgrading) with minimal impact to users.

Oracle VDI Manager Steps

1. In Oracle VDI Manager, go to **Desktop Providers**.
2. Select the desktop provider containing the storage server you would like to suspend.
3. Go to the **Storage** tab, select the storage server, and click the **Maintenance** button.
4. Choose a time for the server to begin entering maintenance, or click **Now** to select the current time.
5. Click **OK** to submit the maintenance mode job.

**Note**

All running desktops associated with a host or storage server can be manually shut down or suspended by navigating to the **Storage** or **Host Desktop** tab. This tab can be accessed by clicking the **Host** or **Storage** server hyperlink.

9.7. Deleting 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.

**Note**

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. In Oracle VDI Manager, go to **Desktop Providers**.
2. Select an Oracle VDI or Microsoft Hyper-V desktop provider.
3. Go to the **Storage** tab.
4. Select a storage server.

The Storage Summary page is displayed for the storage server.

5. Click the **Orphan Disk** link.

The Orphan Disk page is displayed.

6. Select the orphan disks to delete and click Delete.

**Note**

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-pooldesktop-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...]
```

9.8. Oracle VDI Centers and Failover

Failover enables an Oracle VDI Center to recover automatically from the loss of the primary host. Failover is available only when an Oracle VDI Center is configured for high availability. High availability is enabled automatically when you add the first secondary host to the Oracle VDI Center. See [Section 3.1, “About Oracle VDI Centers and Hosts”](#) for details of Oracle VDI Center configuration and high availability.

You add and remove hosts from an Oracle VDI Center with the `vda-config` command. See the following for more information:

[Section 3.6, “How to Configure Oracle VDI on a Primary Host”](#)

[Section 3.7, “How to Configure Oracle VDI on a Secondary Host”](#)

[Section 3.9, “How to Reconfigure Oracle VDI on a Host”](#)

Failover happens automatically and is triggered by a failure of the primary host in an Oracle VDI Center. During failover, the secondary host with the replication database is automatically promoted to become the new primary in the Oracle VDI Center. When connectivity to the original primary is restored, the original primary is reconfigured as a secondary host and it hosts the replication database.

An Oracle VDI Center can only have one replication database, all other secondary hosts have no database role. To change the replication host, see [Section 9.8.1, “How to Change the Replication Database Host”](#). If you are using a remote database instead of the embedded MySQL Server database, high availability for the database is configured outside of Oracle VDI.

To change the primary host in an Oracle VDI Center manually, see [Section 9.8.2, “How to Change the Primary Host in an Oracle VDI Center”](#).

The Oracle VDI Center Agent is the component that provides secure communication between Oracle VDI hosts and it handles automatic failover and other configuration changes to Oracle VDI Centers.

9.8.1. How to Change the Replication Database Host

If you are using the embedded MySQL Server database, the primary host in the Oracle VDI Center runs the Oracle VDI database (the master database). The first secondary host that is added to the Oracle VDI Center is configured to host the replication database (the slave database). Follow these steps, to change the replication database host. To change the host that runs the master database, see [Section 9.8.2, “How to Change the Primary Host in an Oracle VDI Center”](#).

Oracle VDI Manager Steps

1. Go to Settings → VDI Center.
2. Go to the Database tab.

A list of the Oracle VDI hosts in the VDI Center is displayed.

3. Select an Oracle VDI host and click Activate VDI Database Replication.

A message is displayed that says the new replication host is activated.

CLI Steps

1. Change the replication host.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center setprops -p db.replication.host=<host name>
```

If you specify an empty `<host name>`, you turn off replication and high availability.

2. Check that the change has taken effect.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center status
```

9.8.2. How to Change the Primary Host in an Oracle VDI Center

The primary Oracle VDI host forms the Oracle VDI Center. When you change the primary host, the original primary is reconfigured as a secondary host and hosts the replication database (if you are using the embedded MySQL Server database). To change the replication database host, see [Section 9.8.1, “How to Change the Replication Database Host”](#). Follow these steps, to change the primary host

CLI Steps

1. Change the primary host.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center setprops -p vda.primary.host=<host name>
```

2. Check that the change has taken effect.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center status
```

9.8.3. How to Trigger Failover Manually

In some circumstances you might want to trigger failover manually, for example if automatic failover is unsuccessful. To trigger failover manually, you change the secondary host that has the replication database to be the primary host in the Oracle VDI Center. See [Section 9.8.2, “How to Change the Primary Host in an Oracle VDI Center”](#) for details.

9.8.4. How to Remove an Unresponsive Host from an Oracle VDI Center

Normally you use the `vda-config` command to add and remove hosts from an Oracle VDI Center. However if a host becomes unresponsive, you might not be able use this command. In this situation, you can force the removal of the host from the Oracle VDI Center.

CLI Steps

1. Remove the host from the Oracle VDI Center.

Run the following command as root on any of the remaining hosts in the Oracle VDI Center:

```
# /opt/SUNWvda/sbin/vda-center leave -l <log file> -s -f <host name>
```

2. Check that the change has taken effect.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center status
```

9.8.5. How to Tune Automatic Failover

It is possible to adjust the properties for an Oracle VDI Center to tune the automatic failover behavior. The following table lists the available properties and what they control.

Property	Description
<code>db.connection.timeout</code>	<p>The connection timeout in milliseconds for database connections.</p> <p>The Oracle VDI Service reports a database error to the Oracle VDI Center Agent, if an attempt to connect to the Oracle VDI database takes longer than this timeout.</p> <p>The default is 1000 milliseconds.</p>
<code>db.failover.timeout</code>	<p>The period of time in seconds that the Oracle VDI Center Agent waits before starting failover.</p> <p>The Oracle VDI Center Agent monitors the database error reports from the Oracle VDI Service. If database errors are reported continuously for this period of time, the database is considered as failed. If the embedded Oracle VDI database is used, failover is triggered.</p> <p>The default is 15 seconds.</p>
<code>db.replication.config</code>	<p>Whether the Oracle VDI Center Agent automatically configures database replication. The permitted values are true or false.</p> <p>If set to true, the automatic configuration of the replication database on a secondary host takes place when the first secondary is added or a failover is performed.</p> <p>If set to false, the automatic configuration of the replication database does not take place. High availability is disabled until an administrator manually configures a replication database host, see Section 9.8.1, “How to Change the Replication Database Host”. This provides you with more control over the host that is used for the replication database but means that high availability has to be configured manually..</p> <p>The default is true.</p>

CLI Steps

1. Configure the required properties.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center setprops -p <key>=<value>
```

For example:

```
# /opt/SUNWvda/sbin/vda-center setprops -p db.failover.timeout=20
```

2. Check that the change has taken effect.

Run the following command as root:

```
# /opt/SUNWvda/sbin/vda-center listprops
```

9.9. Providing Feedback and Reporting Problems

To ask a question or provide feedback, please contact the Oracle VDI Team and Community at https://communities.oracle.com/portal/server.pt/community/oracle_desktop_virtualization/392. You can also ask questions at the [Oracle VDI Software Forum](#).

If you are reporting a bug, please provide the following information where applicable:

- Description of the problem, including the situation, where the problem occurs, and its impact on your operation.
- Machine type, operating system release, browser type and version, locale and product release, including any patches you have applied, and other software that might be affecting the problem.
- Detailed steps on the method you have used, to reproduce the problem.
- Any error logs or core dumps.

If you need a fix for a bug, and have an Oracle Premier Support for Software Agreement, open a case with Oracle Support at <https://support.oracle.com>.

9.9.1. Contacting Oracle Specialist Support

If you have an Oracle Customer Support Identifier, contact the Oracle VDI Support team directly for technical assistance at <https://support.oracle.com>. If you not have this information, find the correct Service Center for your country, and then contact Oracle Services to open a service request.

To open a case you need the following information:

- Your Sun Service Contract number or Oracle Customer Support Identifier.
- The product you are using: Oracle Virtual Desktop Infrastructure or Oracle VDI.
- A brief description of the problem you would like assistance with.
- Any logs or support bundles you have, see [Section 9.9.2, “Support Bundles”](#) for details.

9.9.2. Support Bundles

Oracle VDI can generate support bundles containing log files and system configuration from each host in an Oracle VDI Center. This information can be used by Oracle Support to analyze and diagnose system issues.

Administrators generate support bundles using the `vda-center bundle-create` command. The support bundle files can be uploaded for further analysis by Oracle Support.

Generating a Support Bundle

To generate a new support bundle, run the following command, as root, on any host in an Oracle VDI Center:

```
# /opt/SUNWvda/sbin/vda-center bundle-create

Creating support bundle for Oracle VDI Center "VDI Center"
A support bundle will be created on each host before collecting them together.
+ Start support bundle creation on vdi1.example.com...
+ Start support bundle creation on vdi2.example.com...
+ Done (vdi1.example.com)
+ Done (vdi2.example.com)

Collecting support bundles
+ Get support bundle from vdi2.example.com...
+ Done (269714541 Bytes moved.)

Creating archive of support bundles
+ Creating tarball...

The support bundle is located at '/var/tmp/VDI-Center-11_05_29_17-09-22.tar.'
```

By default, this command creates a support bundle on each host in the Oracle VDI Center. It might take several minutes for each support bundle to be created. Once all the support bundles are created, they are copied to the host on which the command is run. All the support bundles are then combined into a single tar archive, which is stored in `/var/tmp` by default.

Support bundles use the Oracle VDI Center Agent for remote communication with the hosts in an Oracle VDI Center. If a host cannot be contacted, for example because of network issues, a warning is displayed and support bundles are created only for the hosts that can be contacted.

The behavior of the `vda-center bundle-create` command can be adapted using one or more of the following options:

```
vda-center bundle-create [-l | --localhost]
                        [-h <host1>,<host2> | --host=<host1>,<host2>]
                        [-d <directory> | --directory=<directory>]
                        [-v | --verbose]
                        [-g | --get]
                        [-b | --backup]
                        [<file name>]
```

Option	Description
<code>-l</code>	Generates a support bundle only for the host on which the command is run. This option works even if the Oracle VDI Center Agent is no longer running on the host.
<code>-h <host1>,<host2> ...</code>	Generates support bundles for the specified hosts only.
<code>-d <directory></code>	Specifies a different directory for storing the support bundles. The specified directory must exist on all hosts. For security reasons, this must be a directory or subdirectory in <code>/tmp/</code> , <code>/var/tmp/</code> , <code>/var/run/</code> , or <code>/var/opt/SUNWvda/</code> .

Option	Description
<code>-v</code>	Prints out additional information messages when the support bundle is created.
<code>-g</code>	Gets the support bundles from the hosts, but they are not combined into a single tar archive.
<code>-b</code>	Includes full Oracle VDI backup data in the support bundle. This option exports the entire content of the Oracle VDI database and includes it in the support bundle.
<code><file name></code>	Specifies the name of the tar archive. If no name is specified, the name <code><center name>-<date></code> is used by default.

Uploading a Support Bundle

Support bundles are uploaded using the file transfer service from Oracle support at supportfiles.sun.com. Oracle Support might request that you upload using a different mechanism. For files up to 2 GB, use a standard browser and either the HTTP or HTTPS protocol to upload the files. For larger files, use the FTP protocol.

1. Using a browser or FTP client, go to supportfiles.sun.com.
2. Select the support bundle file to upload.
3. Select a destination for the file.

Unless Oracle Support request otherwise, select the `cores` directory.

4. Enter a case number for the file.

Oracle Support provide you with a case number when you open a service request is opened. Providing a case number ensures that the file is correctly associated with service request.

5. Click the Upload button to upload the file.

Some browsers do not show the progress of the upload.

Do not click the Upload button multiple times, as this restarts the transfer.

When the upload is complete, a confirmation message is displayed.

The confirmation message contains the full path of the uploaded file. Write down the full path to the file, so that you can provide this information to Oracle Support, if the file is not associated with the correct case number.

Chapter 10. Troubleshooting and FAQs

Table of Contents

10.1. Installation and Configuration	204
10.1.1. Oracle VDI Configuration Is Failing to Import svc_vdadb.xml	204
10.1.2. Can I Try Out MySQL or Set up an Evaluation Oracle VDI Remote Database?	205
10.1.3. Do I Need to Configure Sun Ray Software Separately?	205
10.1.4. Reconfiguring Oracle VDI Fails With "Error While Configuring Database"	205
10.1.5. Oracle VDI Configuration Fails to Create Database Tables With Remote Windows Databases That Use UTF-8	206
10.2. User Directory	207
10.2.1. I Am Having Some Trouble With the User Directory. Can I Adjust the Log Level to Get More Information?	207
10.2.2. Kerberos Authentication to Active Directory Works for a While and Then Stops	207
10.2.3. Can I Use PKI Instead of Kerberos for Authentication to an Active Directory?	208
10.2.4. What Type of Privileged Access to the User Directory Is Required?	208
10.3. Oracle VDI Desktop Provider	208
10.3.1. Why Are My Windows 7 Audio Drivers Not Automatically Installed?	208
10.3.2. Oracle VM VirtualBox Install Is Failing With "Postinstall Script Did Not Complete Successfully" Errors	209
10.3.3. There Is an Error When I Add an Oracle VM VirtualBox Host to a Desktop Provider	209
10.3.4. The Oracle VM VirtualBox Web Service Cannot Be Contacted	210
10.3.5. Are all Oracle VM VirtualBox Releases Compatible With Oracle VDI?	210
10.3.6. How do I Change the Password on my Oracle VM VirtualBox Host?	210
10.3.7. I Can See My Oracle VM VirtualBox Hosted Desktop, But It Will Not Start	211
10.3.8. The Time in My Oracle VDI Hypervisor Desktop Is Too Slow	211
10.3.9. Can I Run More Than 100 Virtual Machines on a Single Oracle VM VirtualBox Server?	212
10.3.10. What Are the Requirements for High Availability for Oracle VM VirtualBox?	212
10.3.11. How Do I Change the Password of the Oracle VM VirtualBox Service?	213
10.4. VMware vCenter Desktop Provider	213
10.4.1. Is VMware ESXi a Supported Virtualization Platform?	213
10.4.2. I Cannot Log into My VMware Virtual Machine	213
10.4.3. Users Cannot Log Into Their VMware Provided Windows desktop	213
10.4.4. Why Does My VMware Virtual Machine Have an Invalid IP Address Or Cannot Be Pinged?	213
10.4.5. I Am Unable to Get a MS RDC Connection on My VMware Virtual Machine	213
10.4.6. Creating a vCenter Desktop Provider Fails With "Unable to Contact VMware VirtualCenter - Host Not Reachable at Port 443" Errors	214
10.4.7. In My VMware Desktop Pool, New Virtual Machines Are Created Automatically, But They Are Not Made Available	214
10.4.8. The VMware Virtual Machine Cloning Process Is Not Operating As Expected	214
10.4.9. The Window Displaying the VMware-Hosted Virtual Desktop Is Freezing	215
10.4.10. I Have Created a New Pool in My VMware Desktop provider and Virtual Machines Are Not Created Automatically	216
10.4.11. How Do I Use VMware Virtual Machines With Multiple Network Adapters?	216
10.4.12. Unused VMware Virtual Machines Are Not Being Recycled	217
10.5. Microsoft Hyper-V and RDS Desktop Providers	218
10.5.1. Sessions Are Started by Oracle VDI on RDS Hosts That Do Not Participate in the Microsoft Remote Desktop Provider. Why Is That Happening?	218
10.5.2. Hyper-V Desktop Cloning Fails With "Cannot Reload MSiSCSI Target List" Errors	218

10.5.3. Can I Enter the Farm Information for the Microsoft Remote Desktop Provider and let Oracle VDI Detect the Individual RDS Hosts Participating in the Farm?	219
10.5.4. Oracle VDI Is Not Able to Communicate With the Windows Server	219
10.5.5. Connection Problems between Oracle VDI and Hyper-V	219
10.6. Desktops and Pools	220
10.6.1. How Do I Make a Desktop Available to a User at All Times?	220
10.6.2. Starting a Desktop Fails With "No suitable Hosts to Start a Desktop for Desktop Provider <Name>" Errors	220
10.6.3. What Is the Difference Between Personal and Flexible Desktop Assignments?	220
10.6.4. Oracle VDI Fast Preparation Is failing	221
10.6.5. Can I Use Wild Cards in Token Names to Represent a Group of Thin Clients in Order to Assign These Thin Clients to a Pool?	221
10.6.6. The Audio in My Ubuntu Desktop Is Playing Too Slowly. What Should I Do?	222
10.6.7. Audio Does Not Play After Changing the Audio Configuration for Oracle VM VirtualBox Hosted Desktops in Oracle VDI Manager	222
10.6.8. How Do I Specify USB Redirection for Sun Ray?	222
10.6.9. What Are the Differences Between MS-RDP and VRDP?	222
10.6.10. Cloning Fails if the Sysprep Timezone Setting Does not Match the Host Timezone	222
10.7. Logging In and Accessing Desktops	223
10.7.1. Users Cannot Access Their Desktops	223
10.7.2. A User Can Log in But Their Desktop is Not Responding	223
10.7.3. Error - "Currently There Is No Desktop Available Or Assigned to You"	224
10.7.4. Is It Possible to Customize the Desktop Login Screen?	225
10.7.5. The Sun Ray Client Is Cycling and Cannot Connect to a Virtual Machine	226
10.7.6. Users Cannot Log in to Ubuntu 8.04 Desktops Because the Network Is Not Enabled	226
10.7.7. How Do I Control Which Sun Ray Server Users Are Redirected to When Disconnected From Their Kiosk Session?	227
10.8. Administration Tools	227
10.8.1. I Cannot Log in to Oracle VDI Manager	227
10.8.2. I Get a Blank Screen After Successfully Logging into the Oracle VDI Manager	227
10.8.3. Error - "You Have Been Logged out Because a Consistent Response Could Not Be Guaranteed"	228
10.8.4. How Can I Change the Password of an Oracle VDI Host?	228
10.8.5. How Do I Change the Password of a Remote MySQL Database?	228
10.8.6. Does the MySQL Database Store All Sun Ray Software Configuration?	228
10.8.7. The vda Command Reports That Oracle VDI Is Not Running Although cacoadm and vda-db-status Say It Is	229
10.8.8. Users Do Not Show Up in Users and Groups in Oracle VDI Manager	229
10.8.9. Is There a Way to Modify the Cacao Logging Behavior So That a Long History Can Be Maintained?	229
10.8.10. Jobs Do Not Finish Even After Canceling Them Using Oracle VDI Manager	229
10.8.11. Can I Adjust the Logging Level for the Oracle VDI Logs?	229
10.8.12. How Do I Log in to the Embedded MySQL Database?	229
10.9. Oracle VDI	230
10.9.1. Oracle VDI Hangs Intermittently When Running on x2270 Hardware	230
10.9.2. The System Is Not Reacting as Expected	230
10.9.3. How Do I Configure DHCP in Oracle VDI?	231

10.1. Installation and Configuration

10.1.1. Oracle VDI Configuration Is Failing to Import svc_vdadb.xml

`vda-config` is failing to import `svc_vdadb.xml` because `TEMP/application/database/vdadb` does not get deleted. This is most commonly seen if a terminal is killed during uninstallation or

configuration of Oracle VDI (`vda-config/install -u`), when the uninstallation/unconfiguration is run from the same Sun Ray session.

Workaround after getting the error:

1. To recover the SVC repository's snapshot, run the following.

```
# /lib/svc/bin/restore_repository
```

- a. When prompted with `Enter Response [boot]`, select `manifest_import` instead of the default, `boot`.
- b. Choose the correct snapshot (`manifest_import-200904??_???` - the time of backup will be in DDMMYY format).
- c. After the system reboots, check to see that `svc:/TEMP/application/database/vdadb:default` has been removed.

2. Run the Oracle VDI configuration as usual.

10.1.2. Can I Try Out MySQL or Set up an Evaluation Oracle VDI Remote Database?

Yes! The **MySQL Sandbox** is a quick and easy way to setup MySQL or try out Oracle VDI remote database setup.

You can find it here: <https://launchpad.net/mysql-sandbox>.

- Download and extract it to a temporary folder.
- Download the MySQL release of your choice from <http://dev.mysql.com/downloads>.

To install a simple MySQL server just execute:

```
<mysql-sandbox-path>/make_sandbox <absolute-path-to-your-mysql.tar.gz>
```

On Oracle Solaris platforms, you might have to add `/usr/sfw/bin` to your path in order to make `mysql_sandbox` work.

More documentation about MySQL Sandbox can be found at: <https://launchpad.net/mysql-sandbox>

10.1.3. Do I Need to Configure Sun Ray Software Separately?

A separate installation of Sun Ray Software is not necessary because Sun Ray Software is installed and automatically set up as part of the Oracle VDI installation and configuration.

10.1.4. Reconfiguring Oracle VDI Fails With "Error While Configuring Database"

When you reconfigure Oracle VDI on a host, the configuration can fail with an `Error While Configuring Database` message and a reference to a log file for additional information.

On an Oracle VDI primary host, the log file typically contains the following:

```
MySQL Database Server Configuration
+ Initializing database...
```

```
...
/opt/SUNWvda/mysql/bin/mysqld: File './mysql-bin.index' not found (Errcode: 13)
110630 23:59:59 [ERROR] Aborting

110630 23:59:59 [Note] /opt/SUNWvda/mysql/bin/mysqld: Shutdown complete
...
Error: Error while configuring database.
```

On an Oracle VDI secondary host, the log file typically contains the following:

```
MySQL Database Slave Configuration
...
+ Initializing database...
110630 23:59:59 [ERROR] Fatal error: Can't change to run as user 'vdadb' ;
Please check that the user exists!
110630 23:59:59 [ERROR] Aborting
110630 23:59:59 [Note] /opt/SUNWvda/mysql/bin/mysqld: Shutdown complete
...
Error: Error while configuring database.
```

The problem is caused by the presence of a `/var/opt/SUNWvda/mysql` directory, which has data from a previous Oracle VDI configuration.

To resolve this problem:

1. Log in as root on the Oracle VDI host.
2. Unconfigure Oracle VDI on the host.

```
# /opt/SUNWvda/sbin/vda-config -u
```

3. Remove the directory `/var/opt/SUNWvda/mysql`.
4. Configure Oracle VDI on the host.

```
# /opt/SUNWvda/sbin/vda-config
```

10.1.5. Oracle VDI Configuration Fails to Create Database Tables With Remote Windows Databases That Use UTF-8

On Windows platforms, MySQL limits key sizes to 767 bytes. Due to this limit, the Oracle VDI configuration process fails when using a remote MySQL database on Windows platforms that have UTF-8 enabled.

There are two possible workarounds for this issue.

1. Modify the `/etc/opt/SUNWvda/vda-schema-create.sql` file on your primary Oracle VDI host and configure Oracle VDI software again.

Change the line:

```
UNIQUE INDEX distinguished_name (`distinguished_name` ASC, `ud_id` ASC) ,
```

to:

```
UNIQUE INDEX distinguished_name (`distinguished_name`(250) ASC, `ud_id` ASC) ,
```

This workaround might cause problems assigning users to pools or desktops if the distinguished name (DN) of the user is longer than 250 characters.

2. Change the character set of the MySQL database to latin1 and configure Oracle VDI again.

This workaround causes problems logging in users who have UTF-8 characters in their user name.

10.2. User Directory

10.2.1. I Am Having Some Trouble With the User Directory. Can I Adjust the Log Level to Get More Information?

Yes, you can increase the detail that is shown in the logs.

By default, all Oracle VDI service messages are logged in the Cacao log files, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#). To increase the logging level for directory services, run the following command as root:

```
# cacoadm set-filter -i vda -p com.sun.directoryservices=ALL
# cacoadm set-filter -i vda -p com.sun.sgd=ALL
```

On Linux platforms, the `cacoadm` command is in `/opt/sun/cacao2/bin`.

After changing the logging level, restart the Oracle VDI service:

```
# /opt/SUNWvda/sbin/vda-service restart
```

After restarting the Oracle VDI service, recreate the problem and check the Cacao log file, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

To reset the logging level for directory services to their default, run the following command as root:

```
# cacoadm set-filter -i vda -p com.sun.directoryservices=NULL
# cacoadm set-filter -i vda -p com.sun.sgd=NULL
```

Then restart the Oracle VDI service:

```
# /opt/SUNWvda/sbin/vda-service restart
```

10.2.2. Kerberos Authentication to Active Directory Works for a While and Then Stops

A temporary solution for this issue is to run the following on each Oracle VDI host:

```
kinit -V administrator@MY.DOMAIN
```

This might be:

1. A time synchronization issue.

Make sure the domain controllers and the Oracle VDI servers are connecting to the same NTP server.

2. A Kerberos configuration issue.

Make sure the Kerberos configuration file (`krb5.conf`) contains the `libdefaults` section and sets the `default_realm` as in the following example:

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

[realms]
```

```
MY.COMPANY.COM = {  
  kdc = my.windows.host  
}  
  
[domain_realm]  
.my.company.com = MY.COMPANY.COM  
my.company.com = MY.COMPANY.COM
```

10.2.3. Can I Use PKI Instead of Kerberos for Authentication to an Active Directory?

You can certainly use PKI authentication and it should offer the same features (including removing computers from the Active Directory) as Kerberos authentication.

10.2.4. What Type of Privileged Access to the User Directory Is Required?

For *LDAP* type of authentication:

- Read access to the entire users and groups base, so that Oracle VDI is able to look up for users and resolve the desktops assigned to the users that log in. (if using Active Directory with a single domain, this is typically under CN=Users,DC=my,DC=domain,DC=com).
- If using Active Directory, read access to the CN=Configuration,DC=my,DC=domain,DC=com location. This is used by Oracle VDI to pre-populate the domain field of the login dialog for end-users, with the domain or the list of subdomains. This is not mandatory, if no such access is given to Oracle VDI, the domain field of the login dialog will be left empty.

For *Active Directory* type of authentication:

- Read access to the entire users and groups base, so that Oracle VDI is able to look up for users and resolve the desktops assigned to the users that log in. (If using Active Directory with a single domain, this is typically under CN=Users,DC=my,DC=domain,DC=com).
- Read access to the CN=Configuration,DC=my,DC=domain,DC=com location. This is used by Oracle VDI to pre-populate the domain field of the login dialog for end-users, with the domain or the list of subdomains. This is not mandatory, if no such access is given to Oracle VDI, the domain field of the login dialog will be left empty.
- Write access to the computers location. This is typically under CN=Computers,DC=my,DC=domain,DC=com when a Windows host joins to the my.domain.com domain. Write access to the computers location is used by Oracle VDI to delete the corresponding computer entry from the AD when a cloned desktop (VM) gets destroyed. The computer entry is automatically created by AD when the cloned Windows desktop joins the domain, which is generally instructed in the Sysprep. Write access is not mandatory, if you provide a user which has no such access, Oracle VDI won't be able to delete computers entries from the AD and you'll be left with a growing number of computer entries in your AD, this will only happen in the case you are using the cloning of Windows desktops.

10.3. Oracle VDI Desktop Provider

10.3.1. Why Are My Windows 7 Audio Drivers Not Automatically Installed?

32-bit Windows 7 does not ship with drivers for the Oracle VM VirtualBox emulated audio hardware (AC'97). However, running Windows Update should solve the problem by getting an appropriate driver for it automatically. After that update, followed by a reboot, you should have working audio.

For the 64-bit versions of Windows 7 you have to download the Realtek AC'97 drivers to enable audio.

See <http://www.realtek.com.tw/downloads> for download instructions.

10.3.2. Oracle VM VirtualBox Install Is Failing With "Postinstall Script Did Not Complete Successfully" Errors

If you are installing Oracle VM VirtualBox, you may get the following error in the console:

```
## Executing postinstall script.
Configuring VirtualBox kernel modules...
VirtualBox Host kernel module unloaded.
devfsadm: driver failed to attach: vboxdrv
Warning: Driver (vboxdrv) successfully added to system but failed to attach
can't load module: No such device or address
## Aborting due to attach failure.
## Configuration failed. Aborting installation.
pkgadd: ERROR: postinstall script did not complete successfully

Installation of <SUNWvbox> partially failed.
```

This error is typically seen when previous releases of Oracle VM VirtualBox are still installed. Try removing Oracle VM VirtualBox (`./vb-install -u`). Then verify that the following packages have been removed:

- [SUNWvbox](#)
- [SUNWvboxkern](#)

Reboot, then try the installation again.

10.3.3. There Is an Error When I Add an Oracle VM VirtualBox Host to a Desktop Provider

Several errors can occur when adding an Oracle VM VirtualBox host and will result in possible error alerts on either the 'Specify Host' or 'Verify Certificate' wizard steps.

Specify Host Step

After entering the host details and clicking, the next two actions happen:

- Resolve hostname (if used)
- Fetch the SSL and SSH certificates

An error on this page can be related to DNS problems resolving the hostname or issues contacting the host.

1. Verify that all information entered is correct including SSH and SSL ports. The SSL port refers to the port Apache 2 is listening on.
2. Verify that the Oracle VDI host can resolve the host by using 'nslookup <hostname>' from a shell on the Oracle VDI host.
3. If the name can be resolved, verify that the host is running, and SSH and Apache 2 have started successfully. This can be checked as follows:

```
# svcs svc:/network/http:apache2
```

```
# svcs svc:/network/ssh:default
```

Both commands should indicate that the service is 'Online'. If a service is marked as 'maintenance', try resetting it using:

```
# svcadm clear <service_fmri>
```

Verify Certificate Step

After reviewing the certificates and clicking Finish/Next, an error here indicates that the Oracle VM VirtualBox web service cannot be contacted or may not be running.

Verify that the service is online:

```
# svcs svc:/application/virtualbox/webservice:default
```

If the service is in maintenance mode, clear the service and check the status again:

```
# svcadm clear svc:/application/virtualbox/webservice:default
```

If the service is off line, enable it using:

```
# svcadm enable svc:/application/virtualbox/webservice:default
```

10.3.4. The Oracle VM VirtualBox Web Service Cannot Be Contacted

The Oracle VDI Hypervisor installer ([vb-install](#)) runs a check to be sure that the Apache 2 packages are installed on the host. If the Apache 2 packages are not installed, and the check does not notify you, the Oracle VM VirtualBox web service cannot be contacted, and you will not be able to continue with installation. In this case, you should install the Apache 2 packages and try the Oracle VM VirtualBox installation again.

10.3.5. Are all Oracle VM VirtualBox Releases Compatible With Oracle VDI?

No. See [Section 5.1.2, “System Requirements for the Oracle VDI Hypervisor”](#) for details of what is supported.

If you want to create virtual machine templates locally, for example on a laptop, make sure to use the same release as you have installed on your Oracle VDI desktop provider host. This ensures that you install the correct version of the guest additions, and avoids incompatibility problems with the XML configuration files for your virtual machines, which can prevent them from being imported into Oracle VDI.

10.3.6. How do I Change the Password on my Oracle VM VirtualBox Host?

When an Oracle VM VirtualBox host is added to a desktop provider, Oracle VDI uses the specified username for access via SSH and the Oracle VM VirtualBox web service.

To change the password for this user on an Oracle VM VirtualBox host, you must update two passwords, one for the UNIX user and one for the Apache2 password file.

1. To update the UNIX user's password, log in as the target user, run the command, and enter the new password.

```
# /usr/bin/passwd  
passwd: Changing password for root  
New Password:
```

```
Re-enter new Password:
passwd: password successfully changed for root
```

2. To update the Apache2 user's password, run the command.

```
# /usr/apache2/bin/htpasswd -b /etc/apache2/vbox_passwd <user> <new_password>
```

10.3.7. I Can See My Oracle VM VirtualBox Hosted Desktop, But It Will Not Start

In some rare circumstances a desktop maybe left registered and powered off on an Oracle VM VirtualBox host. Desktops in this state for more than a couple of minutes can safely be deleted from the Oracle VM VirtualBox host if necessary as the configuration is stored in the Oracle VDI database and all data on a storage host. When manually unregistering a desktop from Oracle VM VirtualBox ensure that you also unregister the desktop's disk image.

Steps to resolve:

1. Login as the user you specified during the installation of Oracle VM VirtualBox (typically 'root').
2. Determine the UUID of the virtual machine:
 - Execute `VBoxManage list vms`.
 - Or, use the Oracle VDI Manager to obtain the ZFS volume name listed in the Desktop Summary tab. The UUID is the string after the forward slash (example: f3ced2bb-d072-4efc-83c9-5a487872919d).
3. To unregister the virtual machine on the Oracle VM VirtualBox host (this action does not delete the Oracle VDI desktop), execute:

```
VBoxManage unregistervm <uuid> -delete
```

4. To unregister the virtual disk on the Oracle VM VirtualBox host (this action does not delete the Oracle VDI desktop), execute:

```
VBoxManage unregisterimage disk <uuid>
```

10.3.8. The Time in My Oracle VDI Hypervisor Desktop Is Too Slow

Windows allows random applications to change the timer frequency from the default of 100Hz (which gives very good VM performance on Oracle Solaris hosts) to an arbitrary higher value, usually 1kHz.

In general, looking at `VBox.log` (`~/VirtualBox/Machines/VDA/<VMNAME>/Logs/VBox.log`) reliably gives the current timer resolution if one searches for the last line containing `PIT: mode=... (ch=0)`. This works for any guest OS, as long as the number of CPUs assigned to a VM is left at the default (1). This should cover the majority of configurations used with Oracle VDI.

The typical lines are `PIT: mode=2 count=0x2ead (11949) - 99.85Hz (ch=0)` and `PIT: mode=2 count=0x4ad (1197) - 996.81Hz (ch=0)`.

Assuming there is only one application which requests the high timer resolution, it can be found by terminating all running applications one by one, and watching whether the log file shows the drop in timer resolution. This shows up instantaneously.

Also, looking at the output of `prstat` often allows to detect which VM processes use substantially more CPU time than others. This allows reducing the number of candidates if only some VMs use 1kHz timer resolution.

Performance issues caused by the timer resolution are often dormant until the number of VMs on an Oracle VM VirtualBox host exceeds the number of (true) CPU cores in the server. The reason is that Oracle VM VirtualBox tries its best to deal with the situation, which usually keeps a full CPU core busy. When there are more such VMs they block each other, triggering a symptom which is easy to observe - time in the VM runs much slower than it should.

10.3.9. Can I Run More Than 100 Virtual Machines on a Single Oracle VM VirtualBox Server?

If you want to run more than 100 virtual machines on a single Oracle VM VirtualBox host, the semaphores on the Oracle VM VirtualBox host need to be increased. You need to set the number of available semaphores to the number of virtual machines you intend to run, including a security margin for other processes.

The maximum number of virtual machines on a single Oracle VM VirtualBox host is 1023.

Oracle Solaris Steps

To set the semaphores for 1000 virtual machines, run the following commands as root:

```
# prctl -r -n project.max-sem-ids -v 1024 -i project user.root
# projmod -s -K 'project.max-sem-ids=(priv,1024,deny)' user.root
```

The first command changes the available semaphores for the current process, and the second command makes this number a permanent system setting for the root user. If the VBoxSVC process is run by a non-root user, add a user.myuser line to the `/etc/project` file and change the second command.

To check if the setting was applied correctly, run the following command as root:

```
# prctl -i project -n project.max-sem-ids user.root
```

If Oracle VM VirtualBox host is run by a non-root user, you must restart all Oracle VM VirtualBox processes. The easiest way to do this is to reboot the host.

Oracle Linux Steps

To set the semaphores for 1000 virtual machines, run the following commands as root:

```
# echo "kernel.sem = 250 32000 32 1024" >> /etc/sysctl.conf
# /sbin/sysctl -p
```

The first command changes the available semaphores and makes the change persistent, and the second command activates the change. On Oracle Linux platforms, semaphore configuration is a kernel global setting and so it takes effect immediately.

10.3.10. What Are the Requirements for High Availability for Oracle VM VirtualBox?

High Availability for an Oracle VM VirtualBox virtualization platform would require at least two Oracle VM VirtualBox hosts. In the event that one Oracle VM VirtualBox server goes down, all existing desktop sessions would be terminated. Then the terminated sessions would be restarted on the remaining Oracle VM VirtualBox servers as they are requested by users, as long as there is sufficient memory available.

High Availability for Oracle VDI, Sun Ray Software, and MySQL requires two Oracle VDI hosts. See [Section 3.1, "About Oracle VDI Centers and Hosts"](#) for detailed information about the hardware configurations that support this type of redundancy.

10.3.11. How Do I Change the Password of the Oracle VM VirtualBox Service?

In order to change the password for the Oracle VM VirtualBox Webservice User (default: root), you must enter the following command in your UNIX shell.

```
# /usr/apache2/bin/htpasswd -b /etc/apache2/vbox_passwd root <new_passwd>
```

Next, change the updated password in Oracle VDI Manager.

1. Select the provider that is linked to the host in the **Desktop Providers** category.
2. Click on the **Host** Tab, select the host and click **Edit**.
3. Insert the new password into the pop-up window and click **Next**.

10.4. VMware vCenter Desktop Provider

10.4.1. Is VMware ESXi a Supported Virtualization Platform?

Yes, VMware ESXi is a supported virtualization platform, but if problems occur they need to be verified first on bare ESX.

10.4.2. I Cannot Log into My VMware Virtual Machine

This issue could be seen if the snapshot of the machine is older than 30 days. For more information, see <http://support.microsoft.com/kb/154501>

10.4.3. Users Cannot Log Into Their VMware Provided Windows desktop

Verify that the users are configured for remote access and are allowed to perform a remote access.

10.4.4. Why Does My VMware Virtual Machine Have an Invalid IP Address Or Cannot Be Pinged?

1. Verify that your networking interface is properly configured for your ESX server in the Virtual Infrastructure Client.
2. If the network interface is properly configured for your ESX server:

Verify that the network adapter is enabled in the template and is connected to the correct network.

Verify that there is a properly configured DHCP server with enough leases running on the subnet your virtual machine will run on.

See the VMware documentation, available online at http://www.vmware.com/support/pubs/vi_pubs.html

10.4.5. I Am Unable to Get a MS RDC Connection on My VMware Virtual Machine

1. Verify that it has been enabled in the Remote tab of the System Properties dialog.

If this is enabled, the issue probably has to do with your network settings.

2. Verify that the virtual machine's subnet can be reached from the Windows machine from which you run the Remote Desktop Connection client.

If you have set up a private network for your virtual machines, it might not be accessible from a machine not on that network.

10.4.6. Creating a vCenter Desktop Provider Fails With "Unable to Contact VMware VirtualCenter - Host Not Reachable at Port 443" Errors

This error occurs when the VMware vCenter server has an expired certificate.

For more information about how to regenerate an expired certificate, refer to the [VMware Knowledge Base](#).

Once the certificate is regenerated, you should be able to successfully create a desktop provider.

10.4.7. In My VMware Desktop Pool, New Virtual Machines Are Created Automatically, But They Are Not Made Available

1. Verify that you still have enough disk space for your virtual machines.

Depending on the recycle policy settings for your pool before a newly created virtual machine is made available for users, a snapshot is taken. This operation requires sufficient disk space.

2. Verify that the RDP port (typically 3389) of the Windows guest OS instance is open.

Before a newly created virtual machine is made available, the Virtual Desktop Connector verifies whether RDP communication can be established to the virtual machine. The following issues might prevent a successful test:

- The virtual machine is on a private network and cannot be accessed by the Virtual Desktop Connector. Verify your network configuration.
- Remote access is disabled on the Windows guest OS.
- Firewall settings of the Windows guest OS do not allow RDP connections.

10.4.8. The VMware Virtual Machine Cloning Process Is Not Operating As Expected

To determine whether a new virtual machine is ready for use, Oracle VDI tries to open an RDP connection to it. In certain cases, especially if you use a customized VM template for Vista, RDP can become available before the build process has completed; however, a virtual machine made available before the build process has completed cannot be used.

The following procedure describes how to set up a customized virtual machine template VMware customization specs to correct this problem. It requires that RDP is disabled in the virtual machine template and that RDP is not blocked by a firewall when cloning is completed.

Preparations for manual Sysprep for Windows XP VMs (Step 3) and Windows Vista or Windows 7 VMs (Step 4) are also included.

1. Disable RDP by making sure the Remote Desktop checkbox on the Remote section of the System Preference dialog on the Windows Control Panel is unchecked.



Note

If you are using the Windows Firewall, make sure that the Remote Desktop item is checked under Firewall Exceptions.

1. Create a registry file called `enableRdp.reg` at `C:\` with the following content:

```
REGEDIT4
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Terminal Server]
"fDenyTSConnections"=dword:00000000
```

The `enableRdp.reg` file is used at the end of the Sysprep process to enable RDP in the Windows registry.

2. For Windows XP manual Sysprep, include the following under Additional Commands in the Setup Manager tool:

```
regedit /s C:\enableRdp.reg
```

The Setup Manager tool is used to create answer files for Sysprep.

3. For Windows Vista or Windows 7 manual Sysprep and customization specs, create a batch file called `SetupComplete.cmd` in the `%WINDIR%\SetupScripts` directory with the following content:

```
regedit /s C:\enableRdp.reg
```

Windows Vista looks for `%WINDIR%\SetupScripts\SetupComplete.cmd` and executes it at the end of every setup process, including Sysprep. The default setting for `%WINDIR%` is `C:\Windows`.

10.4.9. The Window Displaying the VMware-Hosted Virtual Desktop Is Freezing

If you suspend or power down your virtual machine without first closing the RDP connection, the guest OS dies, but the RDP connection remains active. The result is a non-responsive window displaying the last known state of your Windows session. The following steps show how to set the Run VMware Tools Scripts panel on both the Virtual Infrastructure Client and the guest OS to avoid this problem.

1. Configure the Run VMware Tools Scripts panel on the Virtual Infrastructure Client.
 - a. Select Edit Settings of a particular VM to bring up the Virtual Machine Properties page.
 - b. Click the Options tab.
 - c. Select VMware Tools.

This is where you can modify the behavior of the Power Controls (Start, Stop, Suspend, and Reset).

- d. Next to the Power Off switch (red rectangle), select Shut Down Guest.

This allows the guest OS to shut down gracefully when the Power Control button is pressed.

- e. In the Run VMware Tools Scripts panel, check the Before Powering Off checkbox.
2. Repeat steps a. through e. above to configure the Run VMware Tools Scripts panel on the guest OS.
 3. Modify the `poweroff-vm-default.bat` script on the guest OS.

The install location on the guest OS, typically `C:\Program Files\VMware\VMware Tools`, contains the following default scripts:

```
poweroff-vm-default.bat
poweron-vm-default.bat
resume-vm-default.bat
suspend-vm-default.bat
```

4. Add `tsdiscon.exe` to the `poweroff-vm-default.bat` script.

The `poweroff-vm-default.bat` script is the first to execute when the VM is powered off from the VMware Infrastructure Client. It now calls `tsdiscon.exe`, which closes all open RDP connections.

10.4.10. I Have Created a New Pool in My VMware Desktop provider and Virtual Machines Are Not Created Automatically

- You have not defined a template for the pool. Make sure that your pool configuration points to a virtual machine or template.
- There is not enough disk space available to create copies of the template.

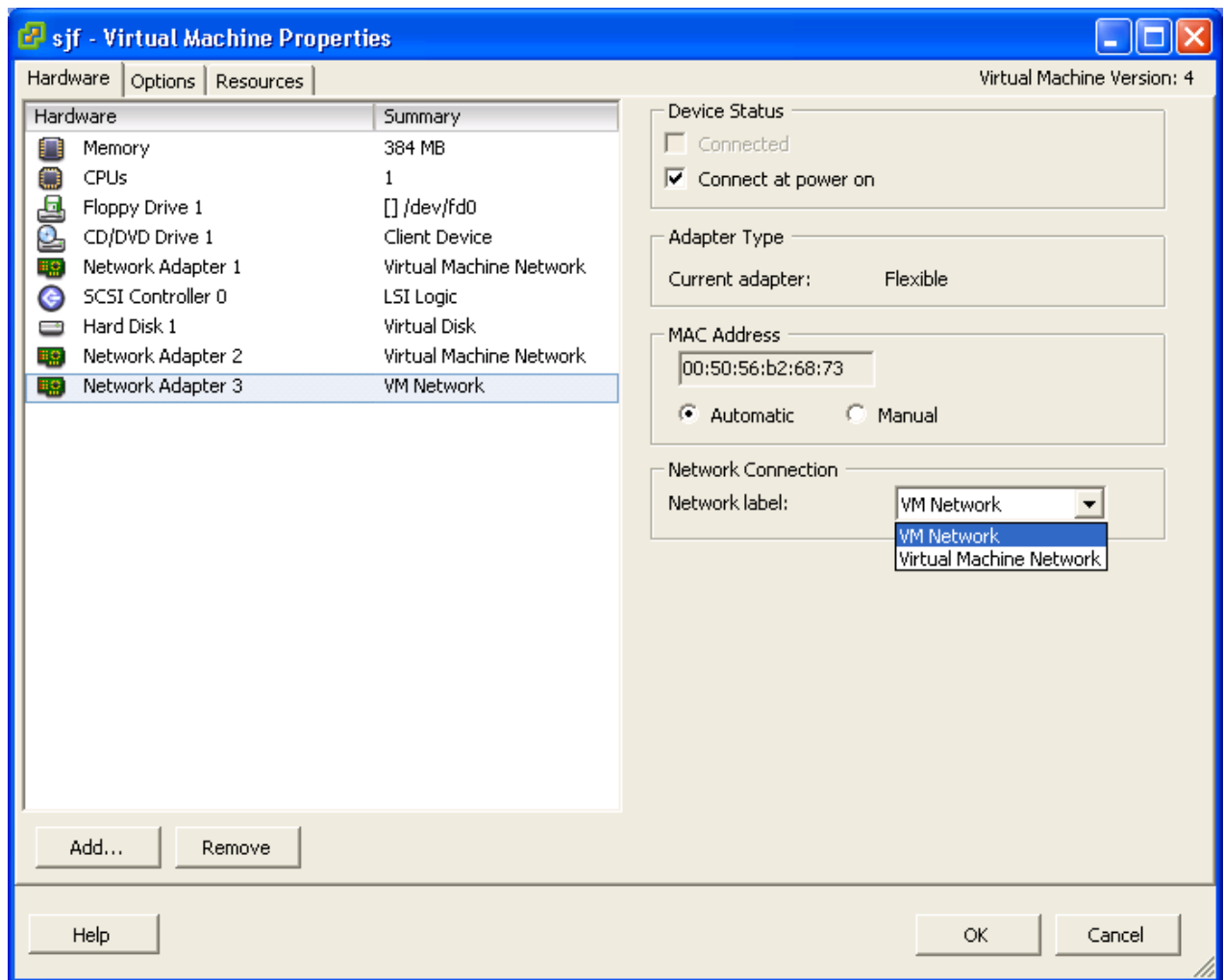
10.4.11. How Do I Use VMware Virtual Machines With Multiple Network Adapters?

Using virtual machines with more than one network interface can be problematic. Oracle VDI expects RDP to be available on the primary interface. If RDP is actually running on a different interface, then the machine may not be prepared successfully or assigned to users.

The problem arises in determining which exactly is the primary interface. The VMware documentation would lead us to believe that it is the primary interface listed in Windows. But, this is not the case. In fact, the primary interface is determined by the order of the network adapters in VMware vCenter. The network adapter with the highest number, usually the one which was added most recently, is the primary network adapter.

To change the network of the primary adapter:

1. Edit the virtual machine settings in VMware vCenter.
2. Select the network adapter with the highest number, for example Network Adapter 3.
3. This is the primary network interface. Change the network label to the appropriate network for RDP.
4. You may need to adjust the other network adapters so that the virtual machine is assigned to all the correct networks.

Figure 10.1. Virtual Machine Network Settings in VMware vCenter

10.4.12. Unused VMware Virtual Machines Are Not Being Recycled

1. Verify that the Power Options on the Windows guest OS have been configured to go into standby when it is idle.
2. Verify that the VMware Tools and the Virtual Desktop Connector Tools are installed and running on the Windows guest OS.

Check the Windows Event Log for any problems with the tools.

If you imported desktops from a previous release of Oracle VDI, verify that the desktop is using the latest version of the Oracle VDI tools. Open the desktop console, go to Control Panel > Add or Remove Programs. Open the support information for Oracle VDI Tools. The version number of the tools must match your Oracle VDI release number.

3. Verify that the virtual machine is configured to suspend when it is in standby.

Check the virtual machine settings (Options/Power management), and make sure that the Suspend the Virtual Machine item is selected.

4. Verify that the Windows guest OS actually enters standby and the virtual machine suspends when the machine is not in use.

**Note**

If you experience problems with the standby feature in Windows XP, see http://www.terranovum.com/projects/energystar/ez_gpo.html. EZ GPO includes a group policy for power options.

10.5. Microsoft Hyper-V and RDS Desktop Providers

10.5.1. Sessions Are Started by Oracle VDI on RDS Hosts That Do Not Participate in the Microsoft Remote Desktop Provider. Why Is That Happening?

This will happen if you add to the provider some of the RDS hosts that participate in a farm, but not all of them. In case of RDS hosts participating in a farm, Oracle VDI detects the farm name which is returned to the Remote Client when a user tries to get a new session. Therefore, the session may be started on any RDS host participating in the farm, even on those that Oracle VDI does not know about.

This is why it is strongly recommended to add all RDS hosts of the farm to the Microsoft Remote Desktop provider. See [Section 5.2.2.4, "Microsoft Remote Desktop Provider RDS Farm Management"](#) for details.

10.5.2. Hyper-V Desktop Cloning Fails With "Cannot Reload MSiSCSI Target List" Errors

The desktop cloning process relies on the `iscsicli` command line interface on the Hyper-V server in order to assign a disk to the new clone. The `iscsicli` command may sometimes hang on the Hyper-V server, which in turn will cause the cloning process to fail with the error "Cannot reload MSiSCSI target list".

Oracle VDI supports a number of settings which allow an administrator to configure how Oracle VDI runs the `iscsicli` command on the Hyper-V server. The properties can be modified using the `vda` command line interface. The settings that can be modified are as follows:

`msiscsi.timeout` - The amount of time that Oracle VDI should wait for MSiSCSI operations to complete on a Windows server.

`msiscsi.retries` - The number of times Oracle VDI retry loading the iSCSI target list on a Windows server before returning an error.

`msiscsi.retry.interval` - The amount of time that Oracle VDI should wait between iSCSI load retries.

To see the current values for the settings use the command:

```
# /opt/SUNWvda/sbin/vda settings-getprops \  
--property=msiscsi.timeout,msiscsi.retries,msiscsi.retry.interval
```

To set new values for the settings use a command like the following:

```
# /opt/SUNWvda/sbin/vda settings-setprops \  
--property=msiscsi.timeout=30,msiscsi.retries=10,msiscsi.retry.interval=15
```

In particular, increasing the value of the `msiscsi.retry.interval` property has been observed to reduce the number of cloning failures due to `iscsicli` failure.

10.5.3. Can I Enter the Farm Information for the Microsoft Remote Desktop Provider and let Oracle VDI Detect the Individual RDS Hosts Participating in the Farm?

No, it is not possible to do so. If you want Oracle VDI to collect information about the sessions and allow some control over them, you need to provide the administrator credentials of each individual RDS host participating in the farm so that Oracle VDI is able to query these hosts about the sessions.

Alternatively, you may choose to only specify the Remote Desktop Server Farm, in which case no session and load information is available in Oracle VDI.

See [Section 5.2.2.4, "Microsoft Remote Desktop Provider RDS Farm Management"](#) for details.

10.5.4. Oracle VDI Is Not Able to Communicate With the Windows Server

Test that WinRM can communicate using HTTP between two Windows servers.

To configure WinRM to listen for HTTP requests run "winrm qc" on your windows platform.

On another windows machine execute the below command where <IP> is the IP address or hostname of the windows server you want to test and <USER> is the local administrator on the windows server you want to test.

```
C:\Documents and Settings\Administrator>winrm id -r:<IP> -u:<USER>
IdentifyResponse
ProtocolVersion = http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd
ProductVendor = Microsoft Corporation
ProductVersion = OS: 5.2.3790 SP: 2.0 Stack: 1.1
```

If you get an error executing this command then WinRM has not been setup correctly on the windows server.

10.5.5. Connection Problems between Oracle VDI and Hyper-V

By default, Windows Server 2008 R2 installs with the Windows Remote Management (WinRM) limited to 15 concurrent operations per user. To check the number of concurrent operations per user, run the following command on Windows host:

```
> winrm get winrm/config
...
Service
MaxConcurrentOperationsPerUser = 15
...
```

For some Oracle VDI deployments, this limit is too low and can cause communication problems between Oracle VDI and Hyper-V. When there are communication problems, the cacao logs typically contain the following error message:

```
SOAP Fault: The WS-Management service cannot process the request. The maximum
number of concurrent operations for this user has been exceeded. Close existing
operations for this user, or raise the quota for this user.
  Actor:
    Code: s:Receiver
    Subcodes: w:InternalError
```

```
Detail: The WS-Management service cannot process the request. This user is
allowed a maximum number of 15 concurrent operations, which has been exceeded.
Close existing operations for this user, or raise the quota for this user.
```

If you see this error message, the solution is to increase the [MaxConcurrentOperationsPerUser](#) property to a value that is appropriate for your Oracle VDI deployment. To change the property, run the following command on the Hyper-V host:

```
> winrm set winrm/config/service @{MaxConcurrentOperationsPerUser="num" }
```

For example:

```
> winrm set winrm/config/service @{MaxConcurrentOperationsPerUser="200" }
```

10.6. Desktops and Pools

10.6.1. How Do I Make a Desktop Available to a User at All Times?

Make sure the user's desktop has a *personal* assignment instead of a *flexible* assignment. For more about desktop assignment types, see [Section 10.6.3, "What Is the Difference Between Personal and Flexible Desktop Assignments?"](#).

10.6.2. Starting a Desktop Fails With "No suitable Hosts to Start a Desktop for Desktop Provider <Name>" Errors

The error 'No suitable hosts to start a desktop for Desktop Provider <ProviderName>.' indicates that there were no hosts with sufficient memory in your desktop provider.

Check the available memory on your hosts using Oracle VDI Manager under the Desktop Provider > Hosts tab.

10.6.3. What Is the Difference Between Personal and Flexible Desktop Assignments?

- **Personal Assignment:** Desktops which have been personally assigned to users are owned by these users (similar to the personal computers under their desks). Thus they will never be recycled and will never become available for other users. (However, an administrator can explicitly remove the assignment and re-assign a desktop to a different user.)
- **Flexible Assignment:** Desktops which have been flexibly assigned are temporarily owned by users. Once users log out of their desktops or their desktops are no longer in use, they will be recycled and become available for other users. As part of the recycle process the desktop assignment will be removed.

Personal assignments are created when you select a specific desktop in the Oracle VDI Admin GUI and assign it explicitly to a user.

If you assign a user (or a group of users) to a pool, the desktop assignments are created on demand the first time the user requests a desktop (or connects to a desktop). The type of assignment (personal or flexible) depends on the pool settings. You can configure this individually for each pool on the Pool - Settings subcategory (see the Desktop Assignment section).

In addition to the assignment type, you can also specify how each pool is filled with desktops. Here you have the choice to manually import desktops, or to clone desktops automatically from a specified template (see the Cloning subcategory).

When you create a new pool we provide default settings for the assignment and cloning configurations. For convenience, the pool wizard offer "Manual", "Dynamic", and "Growing" pool types which only differ in their default settings. You can change the pool settings at any point. The pool type is not stored anywhere - it just defines the initial pool settings and is offered as a shortcut. The main differences in the pool types are as follows:

- **Dynamic pool:** Desktops are cloned from a template. Flexible desktop assignment is the default.
- **Growing pool:** Desktops are cloned from a template. Personal desktop assignment is the default.
- **Manual pool:** Cloning disabled (you have to manually fill this pool via importing desktops). Personal desktop assignment is the default.

Recycling of desktops will only happen for flexibly assigned desktops. This is independent from the desktop provider.

10.6.4. Oracle VDI Fast Preparation Is failing

FastPrep can fail for numerous reasons, but the most common are networking and user permissions. Always ensure that your template (and clones) can correctly resolve the domain name used. Also ensure that the domain and desktop administrators provided have the appropriate permissions.

In the event that FastPrep fails a Windows system error code is usually returned. These error codes can be checked on MSDN:

[http://msdn.microsoft.com/en-us/library/ms681381\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms681381(VS.85).aspx)

Some examples are:

1326 = Logon failure: unknown user name or bad password.

- Check your domain administrator and password

1355 = The specified domain either does not exist or could not be contacted.

- Verify the spelling of your domain and ensure the desktop can resolve the domain name. This is typically caused by incorrect DNS settings. If using Oracle VM VirtualBox NAT networking, ensure the host has the correct DNS server in `/etc/resolv.conf`.

10.6.5. Can I Use Wild Cards in Token Names to Represent a Group of Thin Clients in Order to Assign These Thin Clients to a Pool?

No, but Oracle VDI defines two special tokens to assign all Sun Ray Clients or all Smart Cards to a pool.

AnySunRayClient.000 is a predefined token to assign all Sun Ray Clients (Sun Ray hardware and Oracle Virtual Desktop Client) together to a pool. The user will get a desktop from the pool if the Sun Ray Client is used without a Smart Card.

AnySmartCard.000 is a predefined token to assign all Smart Cards to a pool. The user will get a desktop from the pool if the Sun Ray Client is used with a Smart Card.

Alternatively, you can create tokens in bulk and have them associated to users by using the Oracle VDI CLI as described in [Section 6.8.3, "How to Assign Tokens to Users"](#). Then you can make pool assignments based on existing groups of users in your user directory, or groups you would define especially for Oracle VDI installations using Custom Groups.

10.6.6. The Audio in My Ubuntu Desktop Is Playing Too Slowly. What Should I Do?

The alsa driver in the guest desktop tries to autodetect the ac97 hardware clock. This method does not work with Oracle VM VirtualBox ac97 emulation. Sometimes the driver gets results which look sane but are actually not, and calculates the clock frequency based on that, getting a wrong value. The `ac97_clock` option in `alsa_base.conf` disables autodetection.

To disable the autodetection:

1. Run the following in the command line of the Ubuntu desktop.

```
# sudo gedit /etc/modprobe.d/alsa-base.conf
```

2. Add following line to the end of the `alsa-base.conf` file.

```
options snd-intel8x0 ac97_clock=48000
```

3. Restart the desktop.

10.6.7. Audio Does Not Play After Changing the Audio Configuration for Oracle VM VirtualBox Hosted Desktops in Oracle VDI Manager

If you change a desktop's configuration (for example. audio) from Oracle VDI Manager, the changes will not take effect until the desktop has been unregistered/re-registered on an Oracle VM VirtualBox host. Simply restarting the desktop from within will not result in this behavior. To force the unregister/register, choose either Power Off or Shutdown from Oracle VDI Manager and then choose Start.

10.6.8. How Do I Specify USB Redirection for Sun Ray?

You can adapt the Kiosk session parameters using the Sun Ray Admin GUI. See [Section 7.2.1, "About the Oracle VDI Sun Ray Kiosk Session"](#) and [Section 7.2.2, "How to Adapt the Bundled Sun Ray Kiosk Session"](#) for details. Add the desired drive mapping after any other `uttsc` specific settings: `<specific settings for desktop selector> - <any other uttsc specific settings> -r disk:<drive name>=<path>`

10.6.9. What Are the Differences Between MS-RDP and VRDP?

For more detailed information about the differences, refer to the [Section 6.1.7, "Choosing Between VRDP and MS-RDP"](#).

10.6.10. Cloning Fails if the Sysprep Timezone Setting Does not Match the Host Timezone

The Sysprep process removes a template's timezone setting before cloning and uses the default Sysprep setting (GMT) instead. If the virtualization host is in a different timezone than GMT, the mismatch causes cloning to fail. The workaround for this issue is:

1. Disable cloning in the pool's **Cloning** tab.
2. Click *Edit* in the *System Preparation* section of the *Cloning* tab.
3. In the *Edit System Preparation* window, change the *TimeZone* setting from 85 to the appropriate code for your timezone.

For example, the timezone code for India Standard Time is 190.

4. Click **Save**.
5. Enable cloning in the pool and check if the problem is still reproducible.

10.7. Logging In and Accessing Desktops

10.7.1. Users Cannot Access Their Desktops

1. On a terminal trigger the following command:

```
/opt/SUNWvda/lib/vda-client -u <user>
```

2. If things work as expected, then the vda-client will trigger the startup of the corresponding desktop and should return an IP (for example, 10.16.46.208) or DNS name (for example, xpdesktop01) for accessing the user's desktop. If the RDP port differs from the default, then it will be appended to the IP/ DNS name (for example, 10.16.46.208:49259 or xpdesktop01:49259)
3. With that information it should now be possible to establish an RDP connection to the desktop.
4. If no IP or DNS name is returned by vda-client, Oracle VDI might not be able to resolve the user ID in the user directory.

To check that, change the log level for directory services as described in [Section 10.2.1, "I Am Having Some Trouble With the User Directory. Can I Adjust the Log Level to Get More Information?"](#).

5. Check the Cacao log file for entries of the type:

```
FINEST: userId=<user ID> -> DN=<dn>
```

See [Section 9.3.2, "How to Check the Oracle VDI Log Files"](#) for details.

6. If <dn> is null, that means that no user matching the user id `<test user>` was found in the user directory. It might be necessary to customize the list of attributes `ldap.userid.attributes` to match the directory schema as explained in [Section C.1, "How to Edit LDAP Filters and Attributes"](#).
7. If <dn> is not null, that means that the user matching the user id `<test user>` was correctly found in the user directory.

10.7.2. A User Can Log in But Their Desktop is Not Responding

A user might find that they can log in to Oracle VDI, but they cannot use a desktop because the virtual machine is not responding.

If this happens, the solution is to restart the desktop. This can be performed by an administrator (for example with the `vda desktop-restart` command) or by the user.

For a user to restart their desktop, they must first disconnect from the desktop by moving the mouse up to the top of the screen and clicking the "X" on the remote desktop pulldown menu. When the desktop selector screen is displayed, the user selects the non-responsive desktop and clicks the Reset button to restart the desktop. Restarting a desktop is the same as rebooting a traditional PC, and users also see a warning that they might lose their unsaved data. Once the desktop is rebooted, it can be connected to from the desktop selector screen. Desktops provided by the following provider types cannot be restarted in this way:

- Generic desktop provider
- Microsoft Remote Desktop provider
- Sun Ray Kiosk Session provider

10.7.3. Error - "Currently There Is No Desktop Available Or Assigned to You"

Oracle VDI typically returns the above message for the following reasons:

- There are no desktops directly assigned to the user.
- There is a pool assigned to the user, but no desktops in the pool are available or free to use.
- A desktop has been selected, but it is in an unusable state, typically the startup of the desktop has failed for whatever reasons.

If this message occurs, check the Cacao log file, see [Section 9.3.2, "How to Check the Oracle VDI Log Files"](#).

To establish the root cause, complete the following steps:

1. Check that your desktop/pool assignments are correctly recognized by your system.

The Oracle VDI Kiosk login takes advantage of an internal CLI (`vda-client`) to retrieve that information. You can manually trigger this CLI from a terminal (root privileges are not necessary):

```
$ /opt/SUNWvda/lib/vda-client -a query -u <user>
Password: xxxxxx
Windows 7,Windows7000003,8,User
```

The CLI will ask for the user's password. So you have to enter the same credential information as on the Kiosk session login screen (if authentication is disabled on your system, the `vda-client` CLI will still prompt for a password, but you can leave this blank then - your input is not validated in this case).

If everything works, then you should get a CSV list of desktop/pool assignments. The format is something like

<pool name>,<desktop name>,<desktop ID>,<origin>

If you get an error here, or the system reports no assignments, check the Cacao logs. Look for entries of the ClientRequestWorker that handles vda-client requests:

```
...
Jun 26, 2009 12:10:47 PM com.sun.vda.service.client.ClientRequestWorker run
FINEST: Received request from vda-client (127.0.0.1): query(user=username)
...
Jun 26, 2009 12:10:49 PM com.sun.vda.service.client.ClientRequestWorker run
FINEST: Sent response to vda-client: Windows 7,Windows7000003,8,User
...
```

There might be a couple of issues that could cause problems:

- Authentication failed
- The user name could not be found in LDAP and as a result no user DN could be determined
- No desktop assignments found for the determined user DN.

The log entries between the request received and sent response should give you some insights here.

2. If step 2 worked, request a desktop for your user.

Again this can be done via the vda-client CLI:

```
$ /opt/SUNWvda/lib/vda-client -a start -u <user> \
[-P <poolname> [-D <desktopId>]]
Password: xxxxx
servername:49281
```

The poolname and desktopId parameters are only necessary if multiple desktops are assigned and you want to startup a specific desktop. If there is only one desktop or pool assigned (or you just want to startup the default desktop), then you do not need to provide these parameters. If everything works, then the CLI will return the name (or IP) of the user's desktop/virtual machine optionally followed by a colon and the number of the RDP port.

If that does not work (the CLI reports an error), then you should again take a look into the logs:

```
...
Jun 26, 2009 12:25:14 PM com.sun.vda.service.client.ClientRequestWorker run
FINEST: Received request from vda-client (127.0.0.1): start(user=username)
....
Jun 26, 2009 12:25:18 PM com.sun.vda.service.client.ClientRequestWorker run
FINEST: Sent response to vda-client: servername:49281
....
```

Again the log entries between the request received and sent response should give you some insights about any issues here.

One typical issue is that no suitable host to startup the desktop has been found. In that case you should first check the memory available for running the desktop/virtual machine.

10.7.4. Is It Possible to Customize the Desktop Login Screen?

Adapting the Oracle VDI login screen, which is displayed on Sun Ray Clients, is supported, with some limitations.

It is possible to add a company logo (upper left corner) and to replace the background of the desktop login/selection dialog (middle of the screen) with a custom image. However, there is no way to change the text position and colors of buttons and input elements. Due to this limitation we also require a fixed size background image - otherwise the dialog input elements would appear misplaced on the screen.

Place your custom image(s) in the Kiosk session directory under `/etc/opt/SUNWkio/sessions/vda` - ensure that file permissions (readable for everyone) are correct. The file names must be `dialog_background.png` and `company_logo.png` respectively. For the start you might want to download the sample background image below and make the desired modifications there.

Either quit the existing Sun Ray Kiosk session (click on quit button) or perform a cold restart of Sun Ray services to enforce the creation of new Kiosk sessions. The images should now appear in the Oracle VDI login/desktop selection screen.

Figure 10.2. Position of a Company Logo on a Customized Desktop Login Screen



The other more complex alternative is to replace the default Oracle VDI kiosk session with an adapted version. The Oracle VDI web service API offers all the functionality needed to communicate with the Oracle VDI service for retrieving a list of assigned desktops and starting desktops. You can create your own GUI (login screen and desktop selector) using this web service API, but this requires more programming effort.

10.7.5. The Sun Ray Client Is Cycling and Cannot Connect to a Virtual Machine

1. Verify that you have a virtual machine available to connect to.
2. Verify that remote access is correctly configured on your guest operating system.
3. Verify that the Oracle VDI host can communicate with either your vCenter or your Oracle VM VirtualBox host.

The firewall on the vCenter server might be blocking the communication.

The user name or password might be incorrect.

4. Verify that the VMware tools are installed on the Windows guest OS.
5. If connecting to Windows 7 desktops using Microsoft RDP, ensure that users log in within 30 seconds.

By default Windows 7 disconnects an RDP connection if no-one logs in within 30 seconds.

10.7.6. Users Cannot Log in to Ubuntu 8.04 Desktops Because the Network Is Not Enabled

Ubuntu has the old "Debian style" network behavior so that every MAC address change (every clone) bumps the network interface name by one. The result is that getting a working network configuration

requires a few admin mouse clicks. The only solution to this is at template preparation time by excluding the Oracle VM VirtualBox MAC address range (08:00:27:*) from the "persistent net" machinery in `/lib/udev/rules.d/75-persistent-net-generator.rules` and then purging `/etc/udev/rules.d/70-persistent-net.rules`.

For more details on persistent net changes, refer to <http://ubuntuforums.org/archive/index.php/t-1045715.html>.

10.7.7. How Do I Control Which Sun Ray Server Users Are Redirected to When Disconnected From Their Kiosk Session?

When users disconnect from their session, they are redirected to the first Sun Ray server contacted by default. You can configure the redirection behavior using the command line.

To ensure redirection to the first Sun Ray server contacted:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p client.autoredirect.firstserver=enabled
```

To ensure redirection to the most recently contacted Sun Ray server:

```
# /opt/SUNWvda/sbin/vda settings-setprops -p client.autoredirect.firstserver=disabled
```

10.8. Administration Tools

10.8.1. I Cannot Log in to Oracle VDI Manager

This is most likely an issue with cacao or the vda service

1. If the Oracle VDI host runs into a virtual machine, check that the machine has enough RAM
2. Check the status of cacao and the vda service as described in [Section 10.9.2, "The System Is Not Reacting as Expected"](#).
3. Try restarting the service:

```
/opt/SUNWvda/sbin/vda-service restart
```

10.8.2. I Get a Blank Screen After Successfully Logging into the Oracle VDI Manager

This is most likely an issue with the MySQL database

1. Try restarting the service

```
/opt/SUNWvda/sbin/vda-service restart
```

2. If problem persists, you need to troubleshoot the MySQL database:

If you are using the Oracle VDI MySQL Embedded database, it is important to know that MySQL Embedded is quite demanding regarding physical resources, this specifically concerns CPU power, RAM and network bandwidth. The first thing to check is always if the network connectivity is provided and that the database service is running.

Run the following command to check if the embedded MySQL database Master and Slave (if configured) are running.

```
/opt/SUNWvda/sbin/vda-db-status
```

On Oracle Solaris platforms, you can also check that the status of the database on the Master or Slave host with the following command:

```
# svcs svc:/application/database/vdadb:default
```

If everything is fine you should see something similar to this:

```
STATE STIME FMRI
online Mrz_18 svc:/application/database/vdadb:default
```

If the database service is not running, start it.

On Oracle Solaris platforms, use either of the following commands:

```
# svcadm enable svc:/application/database/vdadb:default
```

```
# svcadm clear svc:/application/database/vdadb:default
```

On Linux platforms, use the following command:

```
# /etc/init.d/vda-db-init start
```

If none of this helps, check the MySQL log files for possible root causes for your database problems. The log files in `/var/opt/SUNWvda/mysql`. Information about the MySQL Cluster log file format can be found in the official MySQL documentation [MySQL Cluster Log Messages](#).

10.8.3. Error - "You Have Been Logged out Because a Consistent Response Could Not Be Guaranteed"

Refer to the Troubleshooting item [Section 10.8.1, "I Cannot Log in to Oracle VDI Manager"](#).

10.8.4. How Can I Change the Password of an Oracle VDI Host?

If you need to change the root password of an Oracle VDI host, run the following UNIX command.

```
# passwd root
New Password: <enter new password>
Re-enter new Password: <confirm>
```

10.8.5. How Do I Change the Password of a Remote MySQL Database?

During the initial configuration of Oracle VDI (using an external database), an Oracle VDI database user account (default, `vdadb`) was created.

1. Change the password on the MySQL side by using the following MySQL CLI commands.

```
mysql> UPDATE mysql.user SET password=PASSWORD('<new_password>') WHERE user='vdadb';
mysql> FLUSH PRIVILEGES;
```

2. In order to change the password on Oracle VDI, reconfigure Oracle VDI.

See [Section 3.9, "How to Reconfigure Oracle VDI on a Host"](#)

10.8.6. Does the MySQL Database Store All Sun Ray Software Configuration?

No, the Sun Ray Software configuration is stored in an LDAP-based datastore.

10.8.7. The vda Command Reports That Oracle VDI Is Not Running Although cacoadm and vda-db-status Say It Is

If you run the `/opt/SUNWvda/sbin/vda` command, and:

1. You are getting the error message, "This command cannot be used because Oracle Virtual Desktop Infrastructure is not running on this server",
2. `cacoadm` and `vda-db-status` show that Oracle VDI is running fine,

look in your `/etc/hosts` file to see if you have an IPv6 localhost there. Comment that out and try to run the `vda` command again.

10.8.8. Users Do Not Show Up in Users and Groups in Oracle VDI Manager

It might be necessary to customize the LDAP filters `ldap.user.object.filter` and `ldap.user.search.filter` as described in [Appendix C, User Directory LDAP Filters and Attributes](#), especially if the user directory is OpenLDAP or Novell eDirectory.

10.8.9. Is There a Way to Modify the Cacao Logging Behavior So That a Long History Can Be Maintained?

Yes. See [Section 9.3.2, "How to Check the Oracle VDI Log Files"](#).

10.8.10. Jobs Do Not Finish Even After Canceling Them Using Oracle VDI Manager

You can force to abort all active jobs:

1. Verify that the Oracle VDI service is running.
2. Enter the following command in the shell:

```
# /opt/SUNWvda/mysql/bin/mysql \
--defaults-file=/etc/opt/SUNWvda/my.cnf -D vda -u root -p -e "UPDATE \
t_job SET status = 'CANCELED', endtime = NOW() \
WHERE status IN ('RUNNING', 'QUEUED', 'CANCELLING') AND type <> 'DESTROY_POOL'"
```

3. If asked for a password, enter the MySQL database administrator password selected when you configured Oracle VDI on the primary host.

If the administrator password was automatically generated, see [Section 10.8.12, "How Do I Log in to the Embedded MySQL Database?"](#).

If you are using a remote MySQL database, use the remote database administrator user and password.

10.8.11. Can I Adjust the Logging Level for the Oracle VDI Logs?

By default, all Oracle VDI service messages are logged in the Cacao log file. To change the logging level or the log history, see [Section 9.3.2, "How to Check the Oracle VDI Log Files"](#).

10.8.12. How Do I Log in to the Embedded MySQL Database?



Caution

Logging in to the Oracle VDI database in order to change settings and data is not supported. Only use the Oracle VDI administration tools to perform these tasks.

1. Obtain the database password.

When you configure the primary host in an Oracle VDI Center and you use the embedded MySQL database, you can either provide your own password for the database administrator or have a password automatically generated.

To obtain the password, run the following command as root:

```
# /opt/SUNWut/sbin/utpw -p
```

**Caution**

When you configure the primary host in an Oracle VDI Center, the password selected (whether manually specified or automatically generated) is used for both the embedded Oracle VDI database and the Sun Ray data store. It is possible to change the Sun Ray data store password independently of Oracle VDI, for example by using the Sun Ray Administration Tool. Such password changes are not supported by Oracle VDI, and it might mean that you can no longer access the automatically-generated password.

2. Log in to the embedded database.

On the Oracle VDI host that has the master or slave database, run the following command as root :

```
# /opt/SUNWvda/mysql/bin/mysql --defaults-file=/etc/opt/SUNWvda/my.cnf -u root -p
```

When prompted, type the administrator password.

10.9. Oracle VDI

10.9.1. Oracle VDI Hangs Intermittently When Running on x2270 Hardware

Due to a bug in the Oracle Solaris [ahci](#) driver, if Oracle VDI is running on Oracle Solaris 10 10/09 or Oracle Solaris 10 9/10 on Sun x2270 hardware may hang.

To work around the problem, add the following line in the [/etc/system](#) file and reboot the server:

```
set idle_cpu_no_deep_c = 1
```

10.9.2. The System Is Not Reacting as Expected

A restart of the vda service is recommended.

Restart the Common Agent Container:

```
# cacaoadm stop -f -i vda
# cacaoadm start -i vda
```

On Linux platforms, the [cacaoadm](#) command is in [/opt/sun/cacao2/bin](#).

Check the Cacao log file, see [Section 9.3.2, “How to Check the Oracle VDI Log Files”](#).

To check the Cacao status:

```
cacaoadm status -i vda
```

To check the status of the vda service:

```
cacoadm status -i vda com.sun.vda.service
```

10.9.3. How Do I Configure DHCP in Oracle VDI?

First, install and configure Oracle VDI using `vda-install` and `vda-config`, see [Chapter 3, *Installing Oracle VDI and Configuring Oracle VDI Centers*](#). This installs Sun Ray Software and configures the Kiosk settings. You can then adapt things as needed using the typical Sun Ray Software commands. For example, use `utadm -a <interface name>` to configure a dedicated interconnect for the Sun Ray Clients. This will also ask you for the desired DHCP settings.

Appendix A. Automated Administration Scripts

Table of Contents

A.1. Reading the Return Code	233
A.2. Waiting for a Job to Finish	233
A.3. Parsing the Output of the CLI	234
A.3.1. Subcommands That Result in a Single Job	234
A.3.2. Subcommands That Result in a Multiple Jobs	235
A.3.3. user-search	235
A.3.4. user-show	236
A.3.5. user-desktops	236
A.3.6. group-list	236
A.3.7. group-show	236
A.3.8. token-search	237
A.3.9. token-show	237
A.3.10. token-desktops	237
A.3.11. pool-list	237
A.3.12. pool-show	238
A.3.13. pool-desktops	238
A.3.14. pool-templates	239
A.3.15. desktop-search	239
A.3.16. template-revisions	239
A.3.17. provider-list	240
A.3.18. provider-list-hosts	240
A.3.19. provider-list-storage	240
A.3.20. provider-list-templates	241
A.3.21. provider-list-unmanaged	241
A.3.22. provider-list-networks	242
A.3.23. provider-show	242
A.3.24. provider-storage-orphans	244
A.3.25. directory-list	244
A.3.26. admin-list	245
A.3.27. admin-show	245
A.3.28. role-list	245
A.3.29. job-list	245
A.3.30. job-show	246

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

A.1. Reading the Return Code

The `vda` command returns the following exit codes:

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

A.2. Waiting for a Job to Finish

Some `vda` subcommands return immediately but start an action in the background, known as a job.

The `job-wait` subcommand allows you to wait for a specific job to be completed before the next command is performed.

```
# 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.
```

A.3. Parsing the Output of the CLI

A number of the `vda` subcommands support a parsable 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.
```

The following sections describe the format of output for the subcommands that support the parsable option.

A.3.1. Subcommands That Result in a Single Job

The following `vda` subcommands result in a single job:

- `pool-hv-import`: Import Microsoft Hyper-V desktops into the pool.
- `pool-vb-import`: Import Oracle VM VirtualBox desktops into the pool.
- `pool-vb-import-unmanaged`: Import unmanaged Oracle VM VirtualBox desktops into the pool.
- `desktop-export`: Export a desktop.
- `revision-create`: Create a revision.
- `revision-export`: Export a revision.
- `revision-sysprep`: Sysprep a revision.
- `template-create`: Copy a revision to a new template.
- `template-desktop`: Copy the template to a new desktop.
- `template-export`: Export a template.
- `template-revert`: Revert a template to the most recent revision.
- `provider-migrate-host`: Migrate desktops from a host.
- `provider-replace-storage`: Replace a storage.
- `provider-suspend-storage`: Suspend a storage.

Parsable Output: one line with the following value.

Value	Data Format
Job ID	integer

A.3.2. Subcommands That Result in a Multiple Jobs

The following `vda` subcommands result in multiple jobs:

- `pool-delete`: Delete pools and their desktops.
- `pool-reset`: Reset cloning for the pool.
- `desktop-delete`: Delete desktops.
- `desktop-duplicate`: Duplicate desktops.
- `desktop-restart`: Restart desktops.
- `desktop-start`: Start desktops.
- `desktop-stop`: Stop desktops.
- `desktop-suspend`: Suspend desktops.
- `desktop-template`: Convert the desktops to templates.
- `revision-clone`: Clone desktops from revisions.
- `revision-delete`: Delete revisions.
- `revision-desktop`: Copy revisions to desktops.
- `template-delete`: Delete templates.
- `template-restart`: Restart templates.
- `template-start`: Start templates.
- `template-stop`: Stop templates.
- `template-suspend`: Suspend templates.
- `provider-storage-orphan-delete`: Delete orphan disks.

Parsable Output: list of lines with the following values.

Value	Data Format
Job ID	integer

A.3.3. user-search

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

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

Value	Data Format
Name of the user or group	string

Value	Data Format
Kind of object	User Group
DN of the user or group	string

A.3.4. user-show

Show the desktops available for the user.

Parsable Output for 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 <i>token</i> Group <i>group_name</i> Custom Group <i>group_name</i>

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

Value	Data Format
Pool Name	string

A.3.5. user-desktops

Show the desktops assigned to the user.

Parsable 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

A.3.6. group-list

Lists all custom groups.

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

Value	Data Format
Custom Group Name	string

A.3.7. group-show

Show the pools assigned to the custom group.

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

Value	Data Format
Pool Name	string

A.3.8. token-search

Search for tokens that match the search criteria.

Parsable 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

A.3.9. token-show

Show the desktops available for the token.

Parsable 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 <i>group_name</i> Custom Group <i>group_name</i>

A.3.10. token-desktops

Show the desktops assigned to the token.

Parsable 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

A.3.11. pool-list

List all pools.

Parsable 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
User Directory Name	string

A.3.12. pool-show

Show detailed information about the pool.

Parsable Output for non-PC Pools: 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
Number of Cloning Jobs	integer
Template	None string
Number of Available Desktops	integer
Number of Assigned Desktops	integer
Total Number of Desktops	integer
Guest Pool	Enabled Disabled

Parsable Output for PC Pools: 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
Number of Available Desktops	integer
Number of Assigned Desktops	integer
Total Number of Desktops	integer
Guest Pool	Enabled Disabled

A.3.13. pool-desktops

List all desktops from the pool.

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

Value	Data Format
Desktop Name	string

Value	Data Format
Desktop ID	long
Machine State	Running Starting Paused Powered Off Suspended Stuck Aborted Unknown
Desktop State	Available Used Idle Unresponsive Reserved
DN of Assigned User	string

A.3.14. pool-templates

List all templates from the pool.

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

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

A.3.15. desktop-search

Search for a desktop or desktops.

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

Value	Data Format
Desktop ID	long
Pool Name	string
Desktop Name	string
Machine State	Running Starting Paused Powered Off Suspended Stuck Aborted Unknown
Desktop State	Available Used Idle Unresponsive Reserved
DN of Assigned User	string

A.3.16. template-revisions

List the revisions of the template.

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

Value	Data Format
Revision Name	string
Revision ID	long
Creation Date	timestamp

Value	Data Format
Is It Master	yes no
Cloned Desktops	string

A.3.17. provider-list

List all desktop providers.

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

Value	Data Format
Desktop Provider Name	string
Provider Type	Oracle VM VirtualBox VMware vCenter Microsoft Hyper-V Microsoft Remote Desktop PC Kiosk
Status	OK Unresponsive Major Issues Critical

A.3.18. provider-list-hosts

List all hosts for the Oracle VDI, Microsoft Hyper-V, or Microsoft Remote Desktop desktop providers.

Parsable Output for Oracle VDI and Microsoft Hyper-V Providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Status	Enabled Disabled Unresponsive Maintenance Preparing Maintenance Failed Maintenance
Enabled	Enabled Disabled
CPU Usage	xx% (x.x GHz MHz)
Memory Usage	xx% (x.x GB MB)
Number of Desktops	integer

Parsable Output for Microsoft Remote Desktop Providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Host Name	string
Status	OK Unresponsive
CPU Usage	xx% (x.x GHz MHz)
Memory Usage	xx% (x.x GB MB)
Number of Active Sessions	integer
Number of Disconnected Sessions	integer

A.3.19. provider-list-storage

List all storage servers for the desktop provider.

Parsable Output for Oracle VDI and Microsoft Hyper-V Providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Storage Name	string
Status	Enabled Disabled Unresponsive Maintenance Preparing Maintenance Failed Maintenance
ZFS Pool	string
Capacity	xxx.x GB
Usage	xx.x GB
Number of Desktops	integer

Parsable 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

A.3.20. provider-list-templates

List the templates for the desktop provider.

Parsable Output for Oracle VDI and Microsoft Hyper-V Providers: list of lines with the following values separated by a colon (':').

Value	Data Format
Template Name	string
Template ID	long
User Directory Name	string

Parsable 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

A.3.21. provider-list-unmanaged

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

Parsable Output for Oracle VDI and Microsoft 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

Parsable 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
Path	string

A.3.22. provider-list-networks

List all networks for the desktop provider.

Parsable 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

A.3.23. provider-show

Show detailed information about the desktop provider.

Parsable Output for Oracle VDI and Microsoft Hyper-V Providers: one line with the following values separated by a colon (':').

Value	Data Format
Status	OK Major Issues Critical
Pool Names	comma-separated strings
Total Number of Desktops	integer
Number of Used Desktops	integer
CPU Usage of all Hosts	xx%
Total Memory of all Hosts	xx.xx GB MB
Memory Usage of all Hosts	xx%
Number of Storage Servers	integer
Total Capacity of the Storage Servers	xxx.x GB
Usage of the Storage Servers	xx%

Value	Data Format
Number of Networks	integer
Network Availability	All Hosts Not on some hosts
Comment	string

Parsable Output for VMware vCenter Providers: one line with the following values separated by a colon (':').

Value	Data Format
Status	OK Unresponsive
Pool Names	comma-separated strings
Total Number of Desktops	integer
Number of Used Desktops	integer
Server	string
Datacenters	comma-separated strings
Number of Storage Servers	integer
Total Capacity of the Storage Servers	xxx.x GB
Usage of the Storage Servers	xx%
Comment	string

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

Value	Data Format
Cluster Name	string
Cluster CPU Used	xx%(xx.xx MHz GHz)
Cluster Total Memory	xx.xx GB MB
Cluster Used Memory	xx%(xx.xx MB GB)

Parsable Output for Non-Farm Remote Desktop Providers: one line with the following values separated by a colon (':').

Value	Data Format
Status	OK Major Issues Critical
Pool Names	comma-separated strings
Number of Active Sessions	integer
Number of Disconnected Sessions	integer
Host Farm	false
CPU Usage of all Hosts	xx%
Total Memory of all Hosts	xx.xx GB MB
Memory Usage of all Hosts	xx%
Comment	string

Parsable Output for Farm Remote Desktop Providers: one line with the following values separated by a colon (':').

Value	Data Format
Status	-
Pool Names	comma-separated strings
Host Farm	true
Comment	string

Parsable Output for Generic Providers: one line with the following values separated by a colon (':').

Value	Data Format
Pool Names	comma-separated strings
Total Number of Desktops	integer
Number of Used Desktops	integer
Comment	string

Parsable Output for Kiosk Providers: one line with the following values separated by a colon (':').

Value	Data Format
Pool Names	comma-separated strings
Session Type	Sun Java Desktop System 3 Common Desktop Environment (Obsolete) Sun Ray Connector for Windows OS VMware View Manager Session Xterm Terminal Session
Comment	string

A.3.24. provider-storage-orphans

List the orphaned disks of the storage.

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

Value	Data Format
ZFS Volume	<i>zfs_pool/volume_id/</i>
Size	xxx.x GB
Used Size	xxx.x GB
Cloned Disks	long

A.3.25. directory-list

List all user directories.

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

Value	Data Format
Name	string
Status	OK Unresponsive
AD Domain or Base DN	string

A.3.26. admin-list

List all administrators with their roles.

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

Value	Data Format
Username	string
Roles	comma-separated string

A.3.27. admin-show

Show details for the administrator.

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

Value	Data Format
User Description	string

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

Value	Data Format
Role Name	string
Role Description	string

A.3.28. role-list

List all roles.

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

Value	Data Format
Role Name	string
Role Description	string

A.3.29. job-list

List the existing jobs.

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

Value	Data Format
Job Title	The title of the job, for example, <code>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</code> .
Target of the Job	string

Value	Data Format
Status of the Job	Queued Running Completed Failed Cancelling Cancelled Unknown
ID of the Job	integer
Cancellable	'C' if the job can be canceled

A.3.30. job-show

Show the job details.

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

Value	Data Format
Job Title	The title of the job, for example, Cloning Desktop <i>desktop_name</i> Recycling Desktop <i>desktop_name</i> Starting Desktop <i>desktop_name</i> Powering Off Desktop <i>desktop_name</i> Shutting Down Desktop <i>desktop_name</i> Restarting Desktop <i>desktop_name</i> Deleting Pool <i>pool_name</i>
Target of the Job	string
Status of the Job	Queued Running Completed Failed Cancelling Cancelled Unknown
Start Time	hh:mm:ss
End Time	hh:mm:ss
Job Details	string
Cancellable	true false

Appendix B. Defaults for the Software Bundled With Oracle VDI

Table of Contents

B.1. Sun Ray Windows Connector	247
B.2. Sun Ray Software	248
B.3. Oracle VDI	249

This chapter lists the defaults for the software bundled with Oracle VDI. See [Section 1.3, “About the Oracle VDI Package Software”](#) for details of the bundled software.

B.1. Sun Ray Windows Connector

Oracle VDI Configuration

```
/opt/SUNWuttsc/sbin/uttscadm -c
```

Enables the Sun Ray Windows connector, if the Kiosk and LAN settings succeed.

Sun Ray RDP Settings (uttsc)

Oracle VDI Name	uttsc Option Equivalent
Locale	-l <i>locale</i>
Keyboard Layout	-k <i>keyboard</i>
Hotdesking	-H
Windows Pulldown Header	-b
RDP Packet Data Compression	-z
Color Depth	-A <i>color depth</i>
Theming	-E theming
Desktop Background	-E wallpaper
Show Window Contents While Dragging	-E fullwindowdrag
Transition Effects for Menus	-E menuanimations
Pointer Shadow	-E cursorshadow
Pointer Scheme	-E cursorsettings
Sound	-r sound
Smart Cards	-r scard:on
USB	-r usb:on
Serial Devices	-r comport:
Paths	-r disk:
Printers	-r printer:

See [Section 6.1.3, “How to Configure RDP Options Per Pool”](#) for details of how to configure these settings. Detailed information for these settings can be found in the man page for the `uttsc` command.

B.2. Sun Ray Software

Oracle VDI Configuration

1. `/opt/SUNWut/sbin/utconfig`

Configures basic Sun Ray Software settings:

- Administrator password
- Server for a FOG
- FOG's signature

2. `/opt/SUNWut/lib/support_lib/srwa_config update`

Configures Sun Ray Software Web Administration:

- Tomcat's home directory
- http ports (1660, 1661)
- Webservice's user name (utwww)
- Remote access (enabled)

3. `/opt/SUNWkio/bin/kioskuseradm create -l utku -g utkiosk -i auto -u -c`

Configures Kiosk user accounts.

4. `/opt/SUNWut/lib/utrcmd -n`
`/opt/SUNWut/sbin/utreplica -p -a`
`/opt/SUNWut/sbin/utreplica -s`

Replicates from Primary to Secondary hosts.

5. `/opt/SUNWut/sbin/utadm -L on`

Enables LAN access.

6. `/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.

7. `/opt/SUNWut/sbin/utkiosk -i session -f`

Sets Kiosk Session value to `vda`.

8. `/opt/SUNWut/sbin/utpolicy -a -g -z both -k both -m`

Sets Kiosk Policy for both card users and non-card users.

B.3. Oracle VDI

Oracle VDIConfiguration

On Linux platforms, `cacoadm` is located at `/opt/sun/cacao2/bin/cacoadm`.

1.

```
svc://application/rdpb-broker
svc://application/rdpb-proxy
```

Creates RDP Broker SMF service and Proxy SMF services (Oracle Solaris platforms only).

2. Configures VDA webservice:

- Ports are configured (1800 / 1801)
- `webuser` is set to `noaccess` on Oracle Solaris, and to `daemon` on Linux.
- Remote access is enabled

3.

```
cacoadm stop -f -i vda
```

Stops CACAO.

4.

```
cacoadm set-param java-flags=-Xms4M -Xmx256M -Dcom.sun.management.jmxremote \
-Dfile.encoding=utf-8 -i vda
```

Sets Java and file-encoding flags.

5.

```
cacoadm start -i vda
```

Starts CACAO.

6.

```
cacoadm enable -i vda
```

Sets CACAO to start at boot.

System Preparation

On Windows XP virtual machines:

```
sysprep.exe -mini -reseal -activated -quiet
```

On Windows Vista and Windows 7 virtual machines:

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

Appendix C. User Directory LDAP Filters and Attributes

Table of Contents

C.1. How to Edit LDAP Filters and Attributes	251
C.2. LDAP Filters and Attributes for Users, Groups, and Containers	252
C.2.1. Default LDAP Filters and Attributes for Users, Groups and Containers	253
C.2.2. Active Directory Settings for Users, Groups, and Containers	254
C.2.3. Oracle Directory Server Enterprise Edition Settings for Users, Groups, and Containers.....	254
C.2.4. OpenDS Settings for Users, Groups, and Containers	255
C.2.5. OpenLDAP Settings for Users, Groups, and Containers	255
C.2.6. Novell eDirectory Settings for Users, Groups, and Containers	256
C.3. LDAP Filters and Attributes for Global Oracle VDI Centers	256
C.3.1. Default LDAP Filters and Attributes for Global Oracle VDI Centers	257
C.3.2. Active Directory Settings for Global Oracle VDI Centers	257
C.3.3. Oracle Directory Server Enterprise Edition Settings for Global Oracle VDI Centers	257

C.1. How to Edit LDAP Filters and Attributes

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

Oracle VDI comes with some default LDAP filters that are suitable for Active Directory or Oracle Directory Server Enterprise Edition. But these filters might be incompatible with other types of directories and might 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 [Section 4.14, “About LDAP Filters and Attributes”](#) for details about how Oracle VDI makes use of the different filters and attributes.

Before You Begin

Before editing LDAP filters and attributes, review [Section C.2, “LDAP Filters and Attributes for Users, Groups, and Containers”](#) and [Section C.3, “LDAP Filters and Attributes for Global Oracle VDI Centers”](#).

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](#).

Oracle VDI Manager Steps

1. Log in to Oracle VDI Manager.
2. Select a company in the Settings category.
3. Select the Active Directory or LDAP tab.

4. Click Edit LDAP Configuration.
5. Edit the settings and click Save button.

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.

```
/opt/SUNWvda/sbin/vda directory-getprops
```

For example:

```
example% /opt/SUNWvda/sbin/vda directory-getprops \
-p ldap.user.object.filter,ldap.user.search.filter
ldap.user.object.filter:
(&(|(objectclass=user)(objectclass=person)(objectclass=inetOrgPerson)
(objectclass=organizationalPerson))!(objectclass=computer))
ldap.user.search.filter:
(|(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:

```
/opt/SUNWvda/sbin/vda directory-setprops
```

For example:

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

```
example% /opt/SUNWvda/sbin/vda directory-getprops \
-p ldap.user.search.filter
ldap.user.search.filter:
(|(cn=$SEARCH_STRING)(uid=$SEARCH_STRING)(mail=$SEARCH_STRING))
```

C.2. LDAP Filters and Attributes for Users, Groups, and Containers

Oracle VDI Manager Name	CLI Property Name	Description
User Filter	<code>ldap.user.object.filter</code>	LDAP filter used to identify objects of type user
User Search Filter	<code>ldap.user.search.filter</code>	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. <code>\$SEARCH_STRING</code> is the place holder for the search criteria
User ID Attributes	<code>ldap.userid.attributes</code>	List of comma-separated LDAP attributes storing the userid value for user objects. This is used to find a user given its userid
User Member Attributes	<code>ldap.user.member.attributes</code>	List of comma-separated LDAP attributes on a user object storing the groups the user is a member of
Group Filter	<code>ldap.group.object.filter</code>	LDAP filter used to identify objects of type group

Oracle VDI Manager Name	CLI Property Name	Description
Group Search Filter	<code>ldap.group.search.filter</code>	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. <code>\$SEARCH_STRING</code> is the place holder for the search criteria
Group Member Attributes	<code>ldap.group.member.attributes</code>	List of comma-separated LDAP attributes on a group object storing the users member of the group
Group Short Attributes	<code>ldap.group.short.attributes</code>	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.
Container Object Filter	<code>ldap.container.object.filter</code>	LDAP filter used to identify objects of type container. Containers can be selected as root for custom group filters in the web administration console
Container Search Filter	<code>ldap.container.search.filter</code>	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. <code>\$SEARCH_STRING</code> is the place holder for the search criteria
Default Attributes	<code>ldap.default.attributes</code>	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.

C.2.1. Default LDAP Filters and Attributes for Users, Groups and Containers

The following table contains the default LDAP filters and attributes for users, groups, and containers.

Oracle VDI Manager Name	Default Value
User Filter	<code>(&((objectclass=user)(objectclass=person)(objectclass=inetOrgPerson)(objectclass=organizationalPerson))(!(objectclass=computer)))</code>
User Search Filter	<code>((cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING)(userPrincipalName=\$SEARCH_STRING)(mail=\$SEARCH_STRING))</code>
User ID Attributes	<code>uid,sAMAccountName,userPrincipalName,mail</code>
User Member Attributes	<code>memberof,primaryGroupID</code>
Group Filter	<code>((objectclass=group)(objectclass=groupofnames)(objectclass=groupofuniquenames))</code>
Group Search Filter	<code>((dc=\$SEARCH_STRING)(o=\$SEARCH_STRING)(ou=\$SEARCH_STRING)(cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING)(mail=\$SEARCH_STRING))</code>
Group Member Attributes	<code>member,uniquemember</code>

Oracle VDI Manager Name	Default Value
Group Short Attributes	<code>primaryGroupToken</code>
Container Object Filter	<code>((objectclass=domain)(objectclass=organization)(objectclass=organizationalUnit)(objectclass=container))</code>
Container Search Filter	<code>((cn=\$SEARCH_STRING)(dc=\$SEARCH_STRING)(ou=\$SEARCH_STRING))</code>
Default Attributes	<code>dc,o,ou,cn,uid,mail,member,uniqueMember,memberOf,sAMAccountName,primaryGroupToken,primaryGroupID</code>

C.2.2. Active Directory Settings for Users, Groups, and Containers

The following table contains the recommended settings for Active Directory for users, groups, and containers.

If you use either the `userPrincipalName` attribute or the `mail` attribute for user identification, use this attribute instead of `sAMAccountName` in the following settings.

Oracle VDI Manager Name	Recommended Setting
User Filter	<code>(&(objectclass=user)(!(objectclass=computer)))</code>
User Search Filter	<code>((cn=\$SEARCH_STRING)(sAMAccountName=\$SEARCH_STRING))</code>
User ID Attributes	<code>sAMAccountName</code>
User Member Attributes	<code>memberOf,primaryGroupID</code>
Group Filter	<code>(objectclass=group)</code>
Group Search Filter	<code>(cn=\$SEARCH_STRING)</code>
Group Member Attributes	<code>member</code>
Group Short Attributes	<code>primaryGroupToken</code>
Container Object Filter	<code>(objectclass=container)</code>
Container Search Filter	<code>(cn=\$SEARCH_STRING)</code>
Default Attributes	<code>cn,member,memberOf,sAMAccountName,primaryGroupToken,primaryGroupID</code>

C.2.3. Oracle Directory Server Enterprise Edition Settings for Users, Groups, and Containers

The following table contains the recommended settings for Oracle Directory Server Enterprise Edition for users, groups, and containers.

Oracle VDI Manager Name	Recommended Setting
User Filter	<code>(objectclass=person)</code>
User Search Filter	<code>((cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING))</code>
User ID Attributes	<code>uid</code>

Oracle VDI Manager Name	Recommended Setting
User Member Attributes	<code>memberof</code>
Group Filter	<code>(objectclass=groupofuniqueNames)</code>
Group Search Filter	<code>(cn=\$SEARCH_STRING)</code>
Group Member Attributes	<code>uniquemember</code>
Group Short Attributes	<code>empty</code>
Container Object Filter	<code>((objectclass=domain)(objectclass=organizationalUnit))</code>
Container Search Filter	<code>((dc=\$SEARCH_STRING)(ou=\$SEARCH_STRING))</code>
Default Attributes	<code>dc,ou,cn,uid,uniquemember,memberof</code>

C.2.4. OpenDS Settings for Users, Groups, and Containers

The following table contains the recommended settings for OpenDS for users, groups, and containers.

Oracle VDI Manager Name	Recommended Setting
User Filter	<code>(objectclass=person)</code>
User Search Filter	<code>((cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING))</code>
User ID Attributes	<code>uid</code>
User Member Attributes	<code>memberof</code>
Group Filter	<code>(objectclass=groupofuniqueNames)</code>
Group Search Filter	<code>(cn=\$SEARCH_STRING)</code>
Group Member Attributes	<code>uniquemember</code>
Group Short Attributes	<code>empty</code>
Container Object Filter	<code>((objectclass=domain)(objectclass=organizationalUnit))</code>
Container Search Filter	<code>((dc=\$SEARCH_STRING)(ou=\$SEARCH_STRING))</code>
Default Attributes	<code>dc,ou,cn,uid,uniquemember,memberof</code>

C.2.5. OpenLDAP Settings for Users, Groups, and Containers

The following table contains the recommended settings for OpenLDAP for users, groups, and containers.

Oracle VDI Manager Name	Recommended Setting
User Filter	You must remove <code>(!(objectclass=computer))</code> from the default filter. Recommended is <code>(objectclass=person)</code> .
User Search Filter	<code>((cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING))</code>

Oracle VDI Manager Name	Recommended Setting
User ID Attributes	<code>uid</code>
User Member Attributes	<code>memberof</code>
Group Filter	<code>(objectclass=groupofnames)</code>
Group Search Filter	<code>(cn=\$SEARCH_STRING)</code>
Group Member Attributes	<code>member</code>
Group Short Attributes	empty
Container Object Filter	
Container Search Filter	
Default Attributes	<code>cn,uid,member,memberof</code>

C.2.6. Novell eDirectory Settings for Users, Groups, and Containers

The following table contains the recommended settings for Active Directory for users, groups and containers.

Oracle VDI Manager Name	Recommended Setting
User Filter	You must remove <code>(!(objectclass=computer))</code> from the default filter. Recommended is <code>(objectclass=person)</code> .
User Search Filter	<code>((cn=\$SEARCH_STRING)(uid=\$SEARCH_STRING)(givenName=\$SEARCH_STRING))</code>
User ID Attributes	<code>givenName,cn,uid</code>
User Member Attributes	<code>groupMembership</code>
Group Filter	<code>((objectclass=group)(objectclass=groupofnames)(objectclass=groupofuniquenames))</code>
Group Search Filter	
Group Member Attributes	<code>member,uniquemember</code>
Group Short Attributes	empty
Container Object Filter	<code>(objectclass=organizationalUnit)</code>
Container Search Filter	
Default Attributes	<code>cn,uid,givenName,groupmembership,member,uniquemember</code>

C.3. LDAP Filters and Attributes for Global Oracle VDI Centers

Oracle VDI 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 Oracle Directory Server Enterprise Edition. 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 need to adapt the LDAP filters and attributes accordingly.

See [Section 4.13, “How to Prepare a User Directory for Global Oracle VDI Centers”](#) for a detailed example.

Oracle VDI Manager Name	CLI Property Name	Description
VDI Center Name	<code>ldap.vdicenter.displayname.attributes</code>	List of attributes on an Oracle VDI Center object that contains display name.
VDI Host Filter	<code>ldap.vdihost.object.filter</code>	Filter to match an Oracle VDI host object.
VDI Host DNS Name Attributes	<code>ldap.vdihost.dnsname.attributes</code>	List of attributes on an Oracle VDI host object that contains the DNS name or IP address of the host.
VDI Center Name	<code>ldap.user.vdicenter.attributes</code>	List of attributes on a user object that contains the Oracle VDI Center DN.

C.3.1. Default LDAP Filters and Attributes for Global Oracle VDI Centers

The following table contains the default LDAP filters and attributes for Global Oracle VDI Centers.

Setting Name	Default value
VDI Center Name	<code>displayName,ou</code>
VDI Host Filter	<code>((objectClass=computer)(objectClass=device))</code>
VDI Host DNS Name Attributes	<code>dnsHostName,ipHostNumber,cn</code>
VDI Center User Attributes	<code>seeAlso</code>

C.3.2. Active Directory Settings for Global Oracle VDI Centers

The following table contains the recommended settings for Active Directory for Global Oracle VDI Centers.

Setting Name	Recommended Setting
VDI Center Name	<code>displayName,ou</code>
VDI Host Filter	<code>(objectClass=computer)</code>
VDI Host DNS Name Attributes	<code>dnsHostName,ipHostNumber</code>
VDI Center User Attributes	<code>seeAlso</code>

C.3.3. Oracle Directory Server Enterprise Edition Settings for Global Oracle VDI Centers

The following table contains the recommended settings for Oracle Directory Server Enterprise Edition for Global Oracle VDI Centers.

Setting Name	Recommended Setting
VDI Center Name	ou
VDI Host Filter	(objectClass=device)
VDI Host DNS Name Attributes	ipHostNumber,cn
VDI Center User Attributes	seeAlso

Appendix D. Remote Database Configuration

Table of Contents

D.1. How to Install and Configure a Remote MySQL Database (InnoDB)	259
D.2. How to Create a Privileged Database Administrator	261

This appendix contains basic instructions on installing and configuring of a remote database for use with Oracle VDI. For comprehensive information on installing and configuring MySQL can be found in the MySQL documentation at <http://dev.mysql.com/doc>.

D.1. How to Install and Configure a Remote MySQL Database (InnoDB)

The following procedure describes how to install MySQL 5.1 with an InnoDB storage engine on an Oracle Solaris x86 host.

1. Create the file `/etc/my.cnf`, and add the following content.

```
[mysqld]
user=mysql
datadir=/usr/local/mysql/data
basedir=/usr/local/mysql
port=3306
socket=/tmp/mysql.sock
max_allowed_packet=20M
#transaction_isolation=READ-COMMITTED
lower_case_table_names=1
max_connections=1000
skip-locking
key_buffer=16K
table_cache=4
sort_buffer_size=64K
net_buffer_length=2K
thread_stack=64K
wait_timeout=31536000

innodb_data_home_dir=/usr/local/mysql/data
innodb_data_file_path=ibdata1:10M:autoextend
innodb_log_group_home_dir=/usr/local/mysql/data
innodb_buffer_pool_size=50M
innodb_additional_mem_pool_size=10M
innodb_log_file_size=5M
innodb_log_buffer_size=10M
innodb_flush_log_at_trx_commit = 1
innodb_lock_wait_timeout = 50
```

2. Create a user "mysql" and a group "mysql" by running the following commands.

```
# groupadd mysql
# useradd -g mysql mysql
```

3. Get the MySQL tar file, untar it, and keep it in the `/` directory.
4. Create the directory `/usr/local`, by running the following command.

```
# mkdir /usr/local
```

5. Change to the new directory, and create a symbolic link, called "mysql", that points to the MySQL files in the directory, by running the following commands.

```
# cd /usr/local
# ln -s /mysql-5.1.30-solaris10-i386 mysql
# ls -lrt

total 2
lrwxrwxrwx 1 root root 35 Nov 12 17:33 mysql -> /export/mysql-5.1.30-solaris10-i386
bash-3.00#
```

6. Make sure that the directory contains the proper owner and group permissions by running the following commands.

```
# chgrp -R mysql /mysql-5.1.30-solaris10-i386
# chown -R mysql /mysql-5.1.30-solaris10-i386
```

7. Check the permissions for the directory as well.

```
# cd /usr/local/mysql
# ls -lrt

-rw-r--r-- 1 mysql mysql 19071 Nov 15 13:07 COPYING
-rw-r--r-- 1 mysql mysql 5139 Nov 15 13:07 EXCEPTIONS-CLIENT
-rw-r--r-- 1 mysql mysql 8767 Nov 15 13:07 INSTALL-BINARY
-rw-r--r-- 1 mysql mysql 1410 Nov 15 13:07 README
drwxr-xr-x 2 mysql mysql 1536 Nov 15 13:07 bin
drwxr-xr-x 4 mysql mysql 512 Nov 15 13:07 data
drwxr-xr-x 2 mysql mysql 512 Nov 15 13:05 docs
drwxr-xr-x 2 mysql mysql 1024 Nov 15 13:05 include
drwxr-xr-x 3 mysql mysql 1024 Nov 15 13:06 lib
drwxr-xr-x 4 mysql mysql 512 Nov 15 13:06 man
drwxr-xr-x 10 mysql mysql 512 Nov 15 13:07 mysql-test
drwxr-xr-x 2 mysql mysql 512 Nov 15 13:07 scripts
drwxr-xr-x 27 mysql mysql 1024 Nov 15 13:07 share
drwxr-xr-x 5 mysql mysql 1024 Nov 15 13:07 sql-bench
drwxr-xr-x 2 mysql mysql 512 Nov 15 13:07 support-files
```

8. From the `/usr/local/mysql` directory, run the following command, and check that it provides the corresponding output.

```
# ./scripts/mysql_install_db --user=mysql

To start mysqld at boot time you have to copy support-files/mysql.server to the
right place for your system

PLEASE REMEMBER TO SET A PASSWORD FOR THE MySQL root USER !
To do so, start the server, then issue the following commands:

/usr/local/mysql/bin/mysqladmin -u root password 'new-password'
/usr/local/mysql/bin/mysqladmin -u root -h wipro-33 password 'new-password'

Alternatively you can run:
/usr/local/mysql/bin/mysql_secure_installation

which will also give you the option of removing the test databases and anonymous
user created by default. This is strongly recommended for production servers.

See the manual for more instructions.

You can start the MySQL daemon with:
cd /usr/local/mysql ; /usr/local/mysql/bin/mysqld_safe &

You can test the MySQL daemon with mysql-test-run.pl
cd /usr/local/mysql/mysql-test ;
```



```
perl mysql-test-run.pl

Please report any problems with the /usr/local/mysql/scripts/mysqlbug script!

The latest information about MySQL is available at http://www.mysql.com/ Support MySQL
by buying support/licenses from http://shop.mysql.com/
```

9. From the `/usr/local/mysql` directory, run the following command, and check to see that you get the corresponding output.

```
# ./bin/mysqld_safe --defaults-file=/etc/my.cnf --ledir=/usr/local/mysql/bin --user=mysql &

[1] 15885
# 090323 22:36:26 mysqld_safe Logging to '/usr/local/mysql/data/wipro-33.err'.
090323 22:36:26 mysqld_safe Starting mysqld daemon with databases from
/usr/local/mysql/data
```

10. Now, leave the terminal just the way it is. To make sure the process you just enabled is running all the time, go to the console and start this process.

```
# cd /usr/local/mysql/bin
# ./mysql --user=root

Welcome to the MySQL monitor. Commands end with ; or g.
Your MySQL connection id is 1
Server version: 5.1.30 MySQL Community Server (GPL)

Type 'help;' or 'h' for help. Type 'c' to clear the buffer.

mysql>
```

11. Stop the MySQL daemon by running the following command in a terminal, if you want to stop the daemon.

```
# ./mysqladmin shutdown
```

When the command is run, the terminal, that was left alone, should give the following output.

```
# /usr/local/mysql/bin/mysqld_safe --defaults-file=/etc/my.cnf \
--ledir=/usr/local/mysql/bin --user=mysql &
[1] 16017
# 090323 22:47:38 mysqld_safe Logging to '/usr/local/mysql/data/wipro-33.err'.
090323 22:47:38 mysqld_safe Starting mysqld daemon with databases from
/usr/local/mysql/data
090323 22:49:31 mysqld_safe mysqld from pid file
/usr/local/mysql/data/wipro-33.pid ended
```

D.2. How to Create a Privileged Database Administrator

Oracle VDI requires the credentials of a privileged database administrator in order to create the Oracle VDI database on a remote database.

The following procedure describes how to create a privileged administrator.

For more information about MySQL user account management, refer to the MySQL Server Administration chapter of the [MySQL Reference Manual](#).

1. Use the MySQL command line tool to enter the MySQL interactive mode as root.

```
# ./mysql --user=root
```

2. Use the MySQL `GRANT` statement to create the privileged administrator.

In the following example, a user is granted all privileges.

```
mysql> GRANT ALL PRIVILEGES ON *.* TO '<user>'@'localhost' IDENTIFIED BY ' /  
<password>' WITH GRANT OPTION;  
mysql> GRANT ALL PRIVILEGES ON *.* TO '<user>'@'%' IDENTIFIED BY ' /  
<password>' WITH GRANT OPTION;  
mysql> GRANT ALL PRIVILEGES ON *.* TO '<user>'@'<localhost DNS name>' /  
' IDENTIFIED BY '<password>' WITH GRANT OPTION;
```

In the following example, a user is granted a limited set of privileges that are sufficient to create the Oracle VDI database.

```
mysql> GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP,ALTER ON *.* TO ' /  
<user>'@'%' IDENTIFIED BY '<password>' WITH GRANT OPTION;  
mysql> GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP,ALTER ON *.* TO '<user>'@' /  
<db-host-dns>' IDENTIFIED BY '<password>' WITH GRANT OPTION;
```

Where `<user>` and `<password>` are the user name and password of the user account.

Appendix E. Glossary

The following is a glossary of terms used for Oracle Virtual Desktop Infrastructure (VDI).

A

- ALP The Appliance Link Protocol is used between Sun Ray Clients and the Sun Ray server.
- agent A software entity that performs tasks on behalf of another software entity.

C

- CLI Command Line Interface.
- clone To create a new desktop by copying it from a template and optionally, maintaining a link to the template.
- company A feature to enable multiple user directories to be configured for one Oracle VDI environment. This provides the ability to provide privacy between multiple groups within the same Oracle VDI environment. Each company has its own set of desktop pools.
- corporation A setting for the Company feature that enables multiple user directories without the need for privacy. For example, this is useful for a company with groups in different geographical locations.
- custom group A set of users defined by a filter on the user directory.

D

- daemon Programs that start automatically during system startup and run in the background without user interaction are usually called services in Windows and daemons in UNIX.
- data store A data store allows configuration settings to be replicated and kept synchronized with other servers automatically.
- desktop A virtual machine containing a desktop instance that is executed and managed within Oracle VDI, and accessed through RDP.
- desktop provider An entity that provides unified access to the virtualization platforms that include Oracle VM VirtualBox (Oracle VDI Hypervisor), Microsoft Hyper-V, VMware vCenter, Microsoft Remote Desktop, Sun Ray Kiosk and Generic.
- DTU Sun Ray Desktop Terminal Units (DTU). Replaced by the term Sun Ray Clients.

E

- ESX Type 1 hypervisor by VMware.

F

- flexible assignment Desktops can be temporarily assigned to users as needed from a pool. When a user stops using the assigned desktop, the desktop can be recycled and made available for other users. Flexible assignment is suitable for people who typically work in one or a few applications and have fewer requirements for customizing their desktop environment.

G

Global Oracle VDI Center	A feature that extends the basic "hot desking" experience known from a single Oracle VDI environment to encompass multiple Oracle VDI environments. It helps when users travel from one site to another site and need access to their desktops.
golden image	A desktop template used to create new desktops. See also template .
guest operating system	An operating system that runs on a virtual machine.
guest pool	A pool with the "Guest" flag turned on. 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. Used by the Global Oracle VDI Center feature.
GUI	Graphical User Interface. Oracle VDI Manager is a browser-based graphical user interface to configure the Oracle VDI Center.

H

host	The physical computer on which virtual machines are running.
hotdesking	The ability for a user to remove a smart card, insert it into any other Sun Ray Client, and have the user's session "follow" the user. This enables a user to have instantaneous access to the user's windowing environment and currently running applications from multiple Sun Ray Clients. This is useful when employees are not assigned to a specific workplace.
Hyper-V	Hypervisor by Microsoft. Full name is Microsoft Hyper-V.
hypervisor	A program or specialized operating system to run virtual machines on a host. Type 1 hypervisors are "bare metal", while type 2 hypervisors need a standard operating system.

K

kiosk mode	Kiosk mode is a facility that enables Sun Ray Software to run desktops and applications in a way that bypasses the normal authentication methods of the underlying operating system.
kiosk session	A user session running in kiosk mode.
kiosk session type	<p>A set of scripts and configuration files that define the kind of user session that runs in kiosk mode.</p> <p>Oracle VDI comes with a predefined kiosk session type, called Oracle Virtual Desktop Infrastructure. This session type uses the Sun Ray Windows connector to establish a Remote Desktop Protocol (RDP) connection to a virtual machine.</p> <p>In addition to this, the Oracle VDI Sun Ray Kiosk Session desktop provider enables you to use a different Sun Ray kiosk type instead of a regular Oracle VDI desktop.</p>

L

lifecycle	A desktop is cloned from a template into a pool, used, perhaps reused, recycled, deleted: this is its lifecycle.
-----------	--

M

master revision The template's revision that will be used by default for desktop cloning in pools. Use the command 'Apply for Cloning in Pool' to use a specific revision instead.

O

Oracle VDI [Oracle Virtual Desktop Infrastructure](#) provides a complete solution for managing, hosting, and providing access to virtualized desktop operating systems hosted in the data center.

Oracle VDI Manager The administration GUI used for management of desktops through the &product-short-name;.

P

personal assignment Desktops can be personally assigned to users. When a user stops using a personally assigned desktop, the desktop will be stored with their desktop settings, and it will not be recycled for other users.

policy In this context, policies are settings that specify parameters such as timeout intervals, maximum age, and others that affect the lifecycles of desktops in pools.

pool A collection of desktops sharing the same characteristics. Pools ordinarily contain desktops that are available for assignment as well as those that are no longer in active use and are waiting to be recycled or deleted.

R

RDP Microsoft Remote Desktop Protocol.

recycling When a desktop originating in a pool has not been used for a specified interval or if certain other criteria apply, it is recycled. Recycling can include being returned to the pool for reassignment, reset to snapshot and reused, or deleted. In the latter case, a new desktop might be cloned for the pool.

resume To return a suspended desktop to operation, use the resume feature. See also [suspend](#).

revision Snapshot of a template.

S

SGD [Oracle Secure Global Desktop](#).

SSH Secure Shell, a network protocol that enables exchange of data over a secure channel, using public-key cryptography for authentication.

SSL Secure Sockets Layer, a cryptographic protocol used for secure data transfer.

service Programs that start automatically during system startup and run in the background without user interaction are usually called services in Windows and daemons in UNIX.

snapshot A reproduction of the virtual machine at a given point in time, including the state of the data on all the virtual machine's disks, including whether the virtual machine was powered on, powered off, or suspended.

storage	Location for storage of configuration settings. See also data store .
Sun Ray Software	Sun Ray Software is needed to host Sun Ray sessions for Sun Ray Clients. Sun Ray Software is installed as part of Oracle VDI.
suspend	To save the current state of a running virtual machine. To return a suspended virtual machine to operation, use the resume feature. See also resume .
system preparation	System preparation refers to modifications made to a Windows guest operating system in a virtual machine, typically as it is being deployed. Customization options include changing the new virtual machine's identification and network information.

T

template	A master or golden image of a desktop. Templates are special desktops that are used for cloning new desktops.
token	A unique string that identifies a user. Sometimes this is provided by a smart card.

V

vCenter	A tool by VMware to manage an ESX server.
VDA	Virtual Desktop Architecture. Many Oracle VDI components, such as scripts, use vda as a prefix.
VDI	Virtual Desktop Infrastructure.
VDI Center	One or more Oracle VDI hosts working together. See also Global Oracle VDI Center .
VDI Manager	See Oracle VDI Manager.
VirtualBox	Type 2 hypervisor. Full name is Oracle VM VirtualBox .
virtual disk	A file or set of files that appears as a physical disk drive to a guest operating system. These files can be on the host machine or on a remote file system.
virtual display client	A Sun Ray hardware client.
virtual machine	A virtualized x86 PC environment in which a guest operating system and associated application software can run. Multiple virtual machines can operate on the same host system concurrently.
virtual machine configuration file	A file containing a virtual machine configuration, created when you create the virtual machine. It specifies which virtual devices, such as disks and memory, are present in a virtual machine and how they are mapped to host files and devices.
virtual network	A network connecting virtual machines that does not depend on physical hardware connections.

Appendix F. Licenses for Third-Party Components

Table of Contents

F.1. Apache Software Foundation Licenses	267
F.2. Bouncy Castle License	272
F.3. EclipseLink License	272
F.4. Java Secure Channel (JSCH) for SSH2 License	273
F.5. WSDL4J License	273
F.6. Xerces License	274

This appendix contains licenses for third-party components that might be included in the product.

F.1. Apache Software Foundation Licenses

The following software may be included in this product:

Apache Axis 1.4

This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).
Portions Copyright 2006 International Business Machines Corp.
Portions Copyright 2005-2007 WSO2, Inc.
This product also includes schemas and specification
developed by:
- the W3C consortium (<http://www.w3c.org>)
This product also includes WS-* schemas developed by
International Business Machines Corporation, Microsoft
Corporation, BEA Systems,
TIBCO Software, SAP AG, Sonic Software, and VeriSign
This product also includes a WSDL developed by salesforce.com
- Copyright 1999-2006 salesforce.com, inc.
Portions of the included xmlbeans library were originally
based on the following:
- software copyright (c) 2000-2003, BEA Systems,
<<http://www.bea.com/>>.

Apache Commons Beanutils 1.6

Apache Commons Codec 1.4

Copyright 2002-2011 The Apache Software Foundation
This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).
src/test/org/apache/commons/codec/language/
DoubleMetaphoneTest.java contains
test data from <http://aspell.sourceforge.net/test/batch0.tab>.
Copyright (C) 2002 Kevin Atkinson (kevina@gnu.org). Verbatim
copying and distribution of this entire article is permitted
in any medium, provided this notice is preserved.

Apache Commons Collections 2.1

Apache Commons Digester 1.5

This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).

Apache Commons Discovery 0.2

Apache Commons File Upload 1

Copyright 2002-2008 The Apache Software Foundation
This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).

Apache Commons Logging 1.0.4
Copyright 2003-2007 The Apache Software Foundation
This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).

Apache Jakarta Commons HttpClient 3.1
Copyright 1999-2007 The Apache Software Foundation
This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).

Apache Log4j 1.2.11, 1.2.12
Copyright 1999-2005 The Apache Software Foundation
This product includes software developed at
The Apache Software Foundation (<http://www.apache.org/>).

Apache Tomcat 6.0.16
Copyright (C) 1999-2010, Apache Software Foundation

Apache WS Common Utils 1.0.1

Castor XML 1.2
For a complete list of committers to the Castor project,
please see <http://www.castor.org/1.2/contributors.html>

JAX-RPC 1.1

OpenCSV 1.8

Shale Remoting 1.1.0
Copyright 2004-2007 The Apache Software Foundation

This product includes software developed by
The Apache Software Foundation (<http://www.apache.org/>).

This product contains code written by David Geary and Cay
Horstmann
for the first edition of Core JavaServer Faces.

Wiseman 1

The following applies to all products licensed under the Apache 2.0
License:

You may not use the identified files except in compliance with the
Apache License, Version 2.0 (the "License.")

You may obtain a copy of the License at
<http://www.apache.org/licenses/LICENSE-2.0>. A copy of the license is
also reproduced below.

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or
implied.

See the License for the specific language governing permissions and
limitations under the License.

Apache License
Version 2.0, January 2004
<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions

of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. **Grant of Patent License.** Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.
4. **Redistribution.** You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:
 - (a) You must give any other recipients of the Work or Derivative Works a copy of this License; and
 - (b) You must cause any modified files to carry prominent notices stating that You changed the files; and
 - (c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and
 - (d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. **Submission of Contributions.** Unless You explicitly state otherwise, any Contribution intentionally submitted for

inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.
7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.
8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.
9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at

```
http://www.apache.org/licenses/LICENSE-2.0
```

```
Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or
implied. See the License for the specific language governing
permissions and limitations under the License.
```

F.2. Bouncy Castle License

```
The following software may be included in this product:
Bouncy Castle Crypto APIs
```

```
Please note: our license is an adaptation of the MIT X11 License and
should be read as such.
```

```
License Copyright (c) 2000 - 2009 The Legion Of The Bouncy Castle
(http://www.bouncycastle.org)
```

```
Permission is hereby granted, free of charge, to any person obtaining
a copy of this software and associated documentation files (the
"Software"), to deal in the Software without restriction, including
without limitation the rights to use, copy, modify, merge, publish,
distribute, sublicense, and/or sell copies of the Software, and to
permit persons to whom the Software is furnished to do so, subject to
the following conditions: The above copyright notice and this
permission notice shall be included in all copies or substantial
portions of the Software.
```

```
THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND,
EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF
MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND
NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS
BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN
ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN
CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
```

F.3. EclipseLink License

```
The following software may be included in this product:
Eclipselink 1.1.2
```

```
Eclipse Distribution License - v 1.0
```

```
Copyright (c) 2007, Eclipse Foundation, Inc. and its licensors.
All rights reserved.
```

```
Redistribution and use in source and binary forms, with or without
modification, are permitted provided that the following conditions
are met:
```

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- Neither the name of the Eclipse Foundation, Inc. nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

```
THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS
"AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT
LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR
A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT
OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
```

LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

F.4. Java Secure Channel (JSCH) for SSH2 License

The following software may be included in this product:
Java Secure Channel (JSCH) for SSH2

JSch 0.0.* was released under the GNU LGPL license. Later, we have switched over to a BSD-style license.

Copyright (c) 2002,2003,2004,2005,2006,2007 Atsuhiko Yamanaka,
JCraft, Inc.
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. The names of the authors may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED ``AS IS'' AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL JCRAFT, INC. OR ANY CONTRIBUTORS TO THIS SOFTWARE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

F.5. WSDL4J License

The following software may be included in this product:
WSDL4J

Permission to copy and display the Java APIs for WSDL Specification, in any medium without fee or royalty is hereby granted, provided that you include the following on ALL copies of the Java APIs for WSDL Specification, or portions thereof, that you make:

1. A link or URL to the Java APIs for WSDL Specification at this location: <http://www-124.ibm.com/developerworks/projects/wsdl4j/>
2. The copyright notice as shown in the Java APIs for WSDL Specification.

Except for the limited copyright license granted above, the material

contained herein is not a license, either expressly or impliedly, to any intellectual property owned or controlled by any of the authors or developers of this material. The material contained herein is provided on an "AS IS" basis and to the maximum extent permitted by applicable law, this material is provided AS IS AND WITH ALL FAULTS, and the authors and developers of this material hereby disclaim all other warranties and conditions, either express, implied or statutory, including, but not limited to, any (if any) implied warranties, duties or conditions of merchantability, of fitness for a particular purpose, of accuracy or completeness of responses, of results, of workmanlike effort, of lack of viruses, and of lack of negligence. ALSO, THERE IS NO WARRANTY OR CONDITION OF TITLE, QUIET ENJOYMENT, QUIET POSSESSION, CORRESPONDENCE TO DESCRIPTION OR NON-INFRINGEMENT WITH REGARD TO THIS MATERIAL.

IN NO EVENT WILL ANY AUTHOR OR DEVELOPER OF THIS MATERIAL BE LIABLE TO ANY OTHER PARTY FOR THE COST OF PROCURING SUBSTITUTE GOODS OR SERVICES, LOST PROFITS, LOSS OF USE, LOSS OF DATA, OR ANY INCIDENTAL, CONSEQUENTIAL, DIRECT, INDIRECT, OR SPECIAL DAMAGES WHETHER UNDER CONTRACT, TORT, WARRANTY, OR OTHERWISE, ARISING IN ANY WAY OUT OF THIS OR ANY OTHER AGREEMENT RELATING TO THIS MATERIAL, WHETHER OR NOT SUCH PARTY HAD ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

The name and trademarks of the Authors may NOT be used in any manner, including advertising or publicity pertaining to the Java APIs for WSDL Specification or its contents without specific, written prior permission. Title to copyright in the Java APIs for WSDL Specification will at all times remain with the Authors.

No other rights are granted by implication, estoppel or otherwise.

F.6. Xerces License

The following software may be included in this product:
Xerces

This product includes software developed by the Apache Software Foundation. (<http://www.apache.org/>).

The Apache Software License, Version 1.1

Copyright (c) 2000 The Apache Software Foundation. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
4. The end-user documentation included with the redistribution, if any, must include the following acknowledgment:

"This product includes software developed by the
Apache Software Foundation (<http://www.apache.org/>)."

Alternately, this acknowledgment may appear in the software itself, if and wherever such third-party acknowledgments normally appear.

5. The names "Apache" and "Apache Software Foundation" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact apache@apache.org.
5. Products derived from this software may not be called "Apache", nor may "Apache" appear in their name, without prior written permission of the Apache Software Foundation.

THIS SOFTWARE IS PROVIDED ``AS IS'' AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE APACHE SOFTWARE FOUNDATION OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This software consists of voluntary contributions made by many individuals on behalf of the Apache Software Foundation. For more information on the Apache Software Foundation, please see <http://www.apache.org/>.

Portions of this software are based upon public domain software originally written at the National Center for Supercomputing Applications, University of Illinois, Urbana-Champaign.

