Oracle® Virtual Networking for Windows Hosts Installation and Boot Guide

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Oracle Virtual Networking for Windows Hosts Installation and Boot Guide

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Contents

Using This Documentation

- **Overview** – Describes how to configure a Windows host for local or remote booting using Oracle Virtual Networking host drivers.
- **Audience** – System administrators and authorized service providers.
- **Required knowledge** – Advanced experience managing heterogeneous networks.

Product Documentation Library

Documentation and resources for this product and related products are available at `http://www.oracle.com/goto/oracle-virtual-networking/docs`.

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Provide feedback about this documentation at `http://www.oracle.com/goto/docfeedback`.

Preparing for Host Driver Configuration

This document describes how to configure your Windows host to load Oracle Virtual Networking host drivers at boot time after you set up and configure Oracle Fabric Interconnect. You can use either local boot or remote boot protocol over the Oracle Fabric Interconnect.

These topics provide an overview of configuring your Windows host.

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Related Information

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Host Drivers for Windows Overview

Oracle Fabric Interconnect supports host software for Windows. The host software stack can be installed and supported on Windows hosts that is running Windows 2012 R2, Windows 2008 R2, or Windows 2003. The software is a collection of Oracle specific host drivers, Visual Basic scripts, and other tools. The host drivers for Windows contain the following component modules:

- The vNIC module provides virtual network interface controller services.
- The vHBA module provides virtual host bus adapter services.

Related Information

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Identifying the Boot Method

All computers boot from boot devices, which might include a local disk, a CD-ROM, a USB device, or an Ethernet controller. Depending on the requirement, you can configure the Windows host using any of the boot devices and use any one of the following boot methods:

- "Local Boot Method" on page 10
- "Remote Boot Method" on page 10
    - SAN boot method

Related Information

- "Confirm the OS Version" on page 12

Local Boot Method

When a Windows host boots locally, it loads the OS and host drivers from an internal hard drive.

Related Information

- "Configuring Host Drivers for Local Boot" on page 15
- "Confirm the OS Version" on page 12

Remote Boot Method

Oracle has implemented a ROM BIOS extension for its HCA cards. This extension, called XgBoot, enables you to use Oracle virtual I/O resources as boot devices for the server. You must configure the system BIOS to include XgBoot in the boot order and configure Oracle Fabric Interconnect to make sure virtual resources bootable.

Whatever remote booting process you select, you use the following high-level steps:

1. Set up the boot volume.

    You need the boot image available on the network.

2. Configure bootable I/O resources on the Oracle Fabric Interconnect.

   For SAN booting, this is a VHBA configured as bootable. For PXE boot, you use a bootable VNIC. Either resource must be assigned to a server profile that is bound to the server that boots remotely.

3. Configure the server.

   HCAs on the server must have compatible firmware and their option ROM must be enabled.

4. Connect the server profile on the Oracle Fabric Interconnect to the server.

5. Set the server profile to SAN boot (`sanboot=`).

Related Information

- "Configuring Host Drivers for SAN Boot" on page 27
- "Confirm the OS Version" on page 12

SAN Boot Method

Storage area network (SAN) boot enables you to boot a Windows host from a SAN volume accessed through a virtual host bus adapter (VHBA). The remote disk to boot from is identified by a target world wide port name (WWPN) and a logical unit number (LUN) on a storage disk array device.
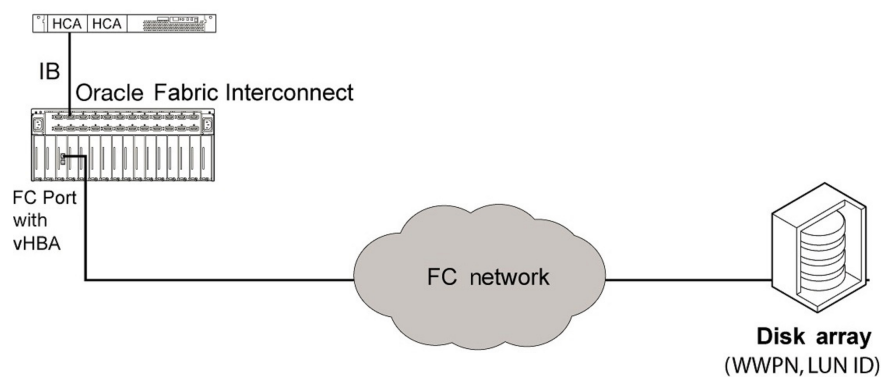
Confirm the OS Version

Before configuring the selected boot method, you must determine if the minimum requirements for your Windows version are fulfilled and then download the host drivers.

Note - During this process, you might use the Oracle Fabric Interconnect to upgrade HCA firmware and option ROM on the Windows host. Windows host must be already configured to communicate with the Oracle Fabric Interconnect.

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1. Use the following command to determine the version of the XgOS operating system.

```
show software
## System status ############################################################
Booted on: Wed Mar 19 21:05:28 GMT 2008
uptime: 48 days, 21 hours, 5 minutes, 55 seconds
.
.
.
INSTALLED XgOS VERSIONS
Current: xsigos-3.8.0
.
.
.
############################################################
```

2. Record the XgOS operating system version, and upgrade the XgOS operating system, if necessary.

    For instructions about upgrading the operating system, refer to the *XgOS User's Guide*.

3. Determine the minimum firmware version of HCA that is supported and write it down.

4. Compare the minimum firmware version you need, to what is currently available from Oracle.

5. Perform the following steps depending on your version of Windows.

    - For SAN booting Windows 2012 R2:

      Configure the Windows server with PowerShell 2.0 (or later) and PowerCLI (or later) plugin.

    - For SAN booting Windows 2008 R2 and Windows 2003:

      Make sure a Linux server is available, and also prepare a Linux installation for the Windows host. For example, a liveISO image.

6. Download the host drivers.

    See *"Downloading the Host Drivers" on page 13* section.

Related Information

- "Configuring Host Drivers for Local Boot" on page 15
- "Configuring Host Drivers for SAN Boot" on page 27

▼ Downloading the Host Drivers

1. **Ensure that you have performed the necessary preliminary tasks.**

2. **Go to: `http://www.oracle.com/technetwork/indexes/downloads`**

3. **Scroll down the page to Drivers, and click Xsigo Drivers.**

4. **Scroll down to Xsigo Downloads, GPL.**

5. **Under Host Drivers, click the link for your OS and version, and download the file to a network-accessible node in your network.**

   See, "Confirm the OS Version" on page 12.

Configuring Host Drivers for Local Boot

These topics describe how to configure the host drivers for your Windows server.

- "Host Driver Installation Task Overview" on page 15
- "Installing the Host Drivers for Windows" on page 16
- "Upgrading the HCA Firmware" on page 18

Related Information

- "Confirm the OS Version" on page 12
- "Configuring Host Drivers for SAN Boot" on page 27

Host Driver Installation Task Overview

Prior to installing host drivers, you should perform the standard data-safety precautions for a Windows host, for example, setting a restore point. These topics provide an overview of the process of installing host drivers, including some prerequisites.

⚠️ **Caution -** Do not enable automatic updates for your Windows systems. Automatic updates can download patches that are not certified and incompatible with your host drivers and I/O resources. Installing such updates can bring your servers down, and correcting this situation can require reinstalling the servers.

The general procedure for installing host drivers for Windows is:

1. Obtain system information from each host, including Windows host OS version, service pack information, CPU model, CPU speed, and memory size. You can run `msinfo32` (or an equivalent tool) to obtain this information.
2. Set a system restore point.
3. You can remove or uninstall any third-party drivers that might be present on the system before you install the host drivers.
4. Reboot the Windows server to ensure that it is booting correctly and in a timely manner.

5. Install the host drivers but, do not update the HCA firmware. For more information, see *"Installing the Host Drivers for Windows" on page 16*.

Note - Updating the HCA firmware is not a required part of installing the Oracle Virtual Networking host drivers for Windows, but it is documented for cases in which a manual upgrade of the HCA firmware might be required. If an HCA update is required, perform the update after the host drivers have been successfully installed.

---

6. Reboot the Windows server after the host drivers have been installed to ensure that the server is still booting correctly. When the drivers finish installing, you are prompted to reboot the system. This is because the newly installed drivers are not loaded into memory until the server has been rebooted.

7. If an HCA firmware upgrade is necessary, upgrade the HCA after the host drivers have successfully been installed. For information, see *"Upgrading the HCA Firmware" on page 18*.

8. If the HCA firmware is updated, reboot the server again before running any tests or checking connectivity to the Oracle Fabric Interconnect. When the HCA firmware update script is finished, you are prompted to reboot the system. Make sure you do because the newly updated firmware is not loaded into memory until the server has been rebooted.

Related Information

- "Confirm the OS Version" on page 12

Installing the Host Drivers for Windows

These topics describe the procedure for installing host drivers for your version of Windows.

- "Installing Host Drivers for Windows Overview" on page 16
- "Install the Host Drivers" on page 17

Related Information

- "Confirm the OS Version" on page 12

Installing Host Drivers for Windows Overview

This topic describes how to install host drivers for the following versions of Windows:

- Windows Server 2012 R2
- Windows Server 2008 R2
- Windows Server 2003

The OS and version present on the Windows host server is autodetected, which enables you to install only the compatible version of host driver.

Note - Check your HCA firmware version and Option ROM version before installing the host drivers for your version of Windows.

You install the host drivers by using the setup.exe, which unpacks and installs the host drivers and IB stack components. When you run setup.exe, the installer runs a wizard that guides you through the installation of the host drivers. When the wizard completes, you must reboot the Windows host.

Note - For Windows 2003, set the driver search option to never search for a Windows update for the host driver, either before or during the installation procedure.

Note - You can perform an unattended driver installation for Windows 2003 and Windows 2008 R2 using the ISS file bundles with the host driver.

▼ Install the Host Drivers

This procedure assumes that the servers have a supported version of the Windows OS installed. Refer to the manufacturer's documentation to install the operating system.

Note - If the previous version of the host drivers has been installed, you might need to remove them before installing the new drivers. If you are prompted to remove the older drivers, remove them, and then reboot the server.

The host drivers for Windows are contained in their own archive folder. When you perform this installation procedure, do not install directly from the archive. Instead, unzip the archive to a separate folder, and then perform the host driver installation from the unzipped folder. When the installation completes, you must reboot the server to load the drivers into memory.

1. **Log in to your Windows server host with a local administrator account or any local account with equivalent administrator rights.**

2. **Download the Oracle host driver archive file applicable for your version of Windows.**

3. **Unzip the archive file.**

4. **Click on the `setup.exe` file in the unzipped folder.**

5. **Click Install in the Ready to Install the Program dialog to initiate the installation.**

   The Setup Status pop-up is displayed.

6. **Click Next in the Installing IB Stack dialog to continue the installation procedure.**

   Additional dialogs are displayed as the components of the host drivers are installed.

   When the installation is complete, the InstallShield Wizard Complete dialog is displayed.

   Note - While the installation continues, you might also see pop-up dialogs displaying additional information—for example, messages such as "OpenIB Stack is being installed" or "Checking drivers" are common.

7. **Click Finish to close the dialog.**

   The server must be rebooted. Depending on which button you clicked on the dialog box, the reboot either occurs automatically or requires user intervention.

   You must allow the server to completely reboot and return to runtime before configuring any vNICs or vHBAs.

Upgrading the HCA Firmware

These topics provide the procedure for upgrading the HCA firmware.

- "Upgrading the HCA Firmware Overview" on page 18
- "Verify the HCA Firmware Version (Windows 2012 R2)" on page 19
- "Firmware Update Script" on page 20

Related Information

- "Confirm the OS Version" on page 12

Upgrading the HCA Firmware Overview

You can update an HCA's firmware version through the Windows host drivers, by invoking the `Xg_FWUpdate.vbs` script.

Note - The `Xg_FWUpdate.vbs` script is not supported by Windows 2012 R2. It is supported by Windows 2008 R2 and Windows 2003.

Note - Updating the Windows Server's HCA firmware is not required as part of installing or updating Windows host drivers. However, in some cases, the HCA firmware must be updated.

To manually upgrade the Windows HCA firmware, you run the `Xg_FWUpdate.vbs` script, which is a menu-driven visual basic script that automates upgrading the HCA firmware on Windows servers. The `Xg_FWUpdate.vbs` script runs in one of two modes, either interactive or non-interactive (scripting), which is controlled by using the optional `-s` argument when you run the script.

- Interactive mode, which prompts you for input anytime the upgrade script requires it. This mode is the default. For information about running the upgrade script in interactive mode, see "Run the HCA Firmware Update Script in Interactive Mode" on page 21.
- Noninteractive, which does not require input. Instead, this mode assumes 'yes' to all prompts. For information about running the upgrade script in noninteractive mode, see "Run the HCA Firmware Update Script in Non-Interactive Mode" on page 23.

The script is run through `cscript`, and contains different arguments that provide flexibility in the way the script runs. If you attempt to run the script without using `cscript`, an error message is displayed.

Note - When the host drivers are installed on the host, you can also upgrade the HCA firmware and Option ROM by using software commands to push these images from the Oracle Fabric Interconnect to the host. There are version requirements for Oracle's XgOS and host drivers for this functionality. For more information, refer to "*Upgrading Host HCA Option ROM and Firmware*" in the System Management chapter of the XgOS User's Guide.

Related Information

- "Host Drivers for Windows Overview" on page 9
- "Confirm the OS Version" on page 12

▼ Verify the HCA Firmware Version (Windows 2012 R2)

You can check the HCA version information from the Oracle Fabric Interconnect.

1. **Ensure that you have performed the necessary preliminary tasks.**
   See, "Confirm the OS Version" on page 12.

2. **On the Oracle Fabric Interconnect, display firmware information.**

   show physical-server *hostname* **hca**

   where *hostname* is the name of the Windows host. For example:

   ```
   show physical-server kingston hca
   ----------------------------------------------------------------
   lid              7
   node-guid        0002c903000a9f7a
   board-id         MT_0A50120005
   device-id        26418
   firmware-version 2.7.0
   hardware-version unknown
   option-version   2.8.7
   ----------------------------------------------------------------
   ```

3. **Compare the versions displayed with the minimum requirements.**

   Refer to the versions recorded when performing the preliminary tasks.

4. **Record the `LID, board-ID, device-ID, firmware-version,` and `option-version`.**

5. **Consider your next step.**

   - If you must install an HCA card, or exchange an HCA card for firmware upgrade, do that now.
   - If the firmware or option ROM must be upgraded, do that now.
   - If the firmware, hardware, and software prerequisites are met, remove the old host driver.

Firmware Update Script

The update script is supported through the `Xg_FWUpdate.vbs` command. You run the script through `Cscript`, and contains different arguments that provide flexibility in the way the script runs. The following example shows the syntax of the `Xg_FWUpdate.vbs` command:

```
Xg_FWUpdate.vbs [-v <0 | 1 | 2 | 3>] [-l LogFilename] [-h]
[<-s [<-dlist> | <-d HCA_ID -f FirmwareFile> | <-all [-detect] [-MinVer | -
MaxVer]>]
```

These are the arguments in the `Xg_FWUpdate.vbs` command.

Argument	Description
-v <0|1|2|3>	An optional choice list that sets the verbosity level of the script output:
	- -v 0 sets no logging of messages. This mode is useful for scripts.

Argument	Description
	▪ -v 1 sets minimum logging of messages. This mode is the default.
	▪ -v 2 sets logging of messages with some debug information included.
	▪ -v 3 sets logging of messages with all debug information written to the update log.
-l LogFilename	An optional argument that specifies the name of the Update Log. By default, the log is named Xg_FWUpdate.log. The log is for Oracle personnel only. Do not use the Update Log unless directed to do so by Oracle.
-h	An optional argument that displays help text and exploded command syntax for the Xg_FWUpdate.vbs command.
-s <-dlist> | <-d HCA_ID -f FirmwareFile>| <-all [-detect] [-MinVer|-MaxVer]>	Sets script mode to answer in the affirmative to all prompts, and sets specific controls for the script: -dlist displays a list of all the HCA Device IDs in the server. -d HCA_ID specifies a comma-separated list of HCA Device IDs. -f FirmwareFile specifies the full path and file name of the firmware image that will be burned onto the HCA. This argument is useful if you are burning third-party HCA images. Do not use third-party images unless directed to do so by Oracle personnel. -all causes the firmware update script to burn firmware on all HCA devices in the current system. -detect causes the preburn validation check to determine if the HCA cards in the server are supported Device IDs and whether they have the supported minimum firmware version installed. If the preburn validation check finds an error, an error code is displayed. -MinVer causes the supported minimum firmware version to be burned onto all HCAs present in the server. -MaxVer causes the supported maximum firmware version to be burned onto all HCAs present in the server.

▼ Run the HCA Firmware Update Script in Interactive Mode

To burn the HCA firmware in interactive mode (which is the default), follow this procedure:

1. Install the Oracle host drivers for Windows.

During installation, the HCA software version is checked.

▪ If the script determines that the HCA card is not supported, the script displays an error. Any HCA Device ID other than 25204 or 25218 is considered an unsupported HCA model type. The upgrade script cannot be run against an unsupported HCA. Contact Oracle Technical Support.

▪ If the script determines the HCA card is supported, but the card's firmware is less than the minimum supported version, the script displays an error. You can run the upgrade script to update the HCA firmware. Proceed to Step 2.

▪ If the script determines that valid HCAs are installed and have a valid firmware version installed, there is no need to run the HCA upgrade script. However, you can still run the

script and update the firmware (for example, to load a third-party image file onto the HCA). If you run the update script, proceed to Step 2.

2. **To run the script, start a command prompt by choosing Start→Run....**

3. **Change directory to:**

   `cd %programfiles%\Xsigo Systems\Support\FirmwareUpdate`

4. **From the prompt, run the following script by issuing the following command:**

```
cscript Xg_FWUpdate.vbs
Microsoft (R) Windows Script Host Version 5.6
Copyright (C) Microsoft Corporation 1996-2001. All rights reserved.
##########################################################################
##
# (C) 2007 Oracle Inc. All rights reserved. This material may not be
# reproduced, displayed, modified or distributed without the express prior
# written permission of the copyright holder.
##########################################################################
##
##########################################################################
##
# Main Menu
##########################################################################
Selected HCA Card Number: 0
HCA Device ID : mt25218_pciconf0
Image Type : failsafe
I.S. Version : 1
Device ID :
Chip Revision : a0
GUID Descr : node port1 port2 sys image
GUIDs : 0002c9020021f1f0 0002c9020021f1f1 0002c9020021f1f2 0002c9020021
f1f3
BOARD ID : mt_0370110001
VSD :
PSID : mt_0370110001
FW Version :
HCA mlx FW Ver : 5.1.400
1) Flash HCA Firmware
2) Change selected card
0) Quit
Select option>
```

5. **When prompted, type 1 to enter the Flash HCA Firmware Menu:**

```
Select option> 1
####################################################################
# Flash HCA Firmware Menu
####################################################################
Selected HCA Card Number: 0
```

```
HCA Device ID : mt25218_pciconf0
Image Type : failsafe
I.S. Version : 1
Device ID :
Chip Revision : a0
GUID Descr : node port1 port2 sys image
GUIDs : 0002c902002410a0 0002c902002410a1 0002c902002410a2 0002c902002410a3
BOARD ID : mt_0370110001
VSD :
PSID : mt_0370110001
FW Version :
HCA mlx FW Ver : 5.1.400
1) 5.2.0
2) 5.1.400
0) Return to previous menu
Select Firmware to Burn>
```

6. **When prompted, select the firmware version that you want to burn onto the HCA in the Windows server.**

   Do not attempt to abort the firmware upgrade process after it has started. This example shows updating the HCA with firmware version 5.2.0.

```
Select Firmware to Burn> 1
Upgrading HCA firmware 5.1.400 to 5.2.0
This Will Flash HCA with Firmware file .\Image\fw-25218-5_2_0-mhea28-xtc_a1-
a2.bin
Please do not interrupt the burn process or reboot the machine...
Wait till burn completes ...
....................................................................
------------------------------------------------------------------------
The firmware on one or more of the HCAs has been upgraded.
It is recommended to reboot the machine in order for changes to take effect.
------------------------------------------------------------------------
Press Enter key to continue
```

7. **Press Enter to exit the update script.**

8. **Reboot the Windows server to bring up the HCAs.**

▼ Run the HCA Firmware Update Script in Non-Interactive Mode

Noninteractive mode is applicable when you are using a script to update the HCAs on multiple Windows servers. This mode assumes "yes" to all prompts, so it does not halt a script and wait for user intervention.

With noninteractive mode, the update script supports burning a third-party firmware image file onto the HCA in addition to burning the firmware images supported by Oracle. However,

Oracle cannot guarantee the performance of HCAs that are updated with unsupported third-party firmware.

Note - When the script first checks for unsupported HCAs and down rev firmware, the script uses non-interactive mode to query all HCAs. The `-s -detect -all` string accomplishes the query. Be aware that you can manually query all installed HCAs by using the following command:

```
cscript Xg_FWUpdate.vbs -s -all -detect
```

When running the script in noninteractive mode, you use the `-s` argument to set the script into non-interactive mode. The examples in this procedure usenoninteractive mode.

The example shows process of running the script to update all HCAs with the minimum supported firmware version.

Note - Running the HCA firmware update script is not part of the standard Windows host driver installation. The procedure is documented for cases in which a manual upgrade of HCA firmware is required or desired.

---

1. **Ensure that you are in the `%programfiles%\Xsigo Systems\Support\FirmwareUpdate`.**

   This is the directory where the script is installed and run.

2. **Issue the `Xg_FWUpdate.vbs -s` command and specify arguments that cause all HCAs to upgrade to the minimum version.**

   Because of non-interactive mode, you will notice that the onscreen text contains no menus.

```
H:\.\Xsigo Systems\Support\FirmwareUpdate> cscript Xg_FWUpdate.vbs -s -all -
minver
Microsoft (R) Windows Script Host Version 5.6
Copyright (C) Microsoft Corporation 1996-2001. All rights reserved.
##########################################################################
##
# (C) 2007 Oracle Inc. All rights reserved. This material may not be
# reproduced, displayed, modified or distributed without the express prior
# written permission of the copyright holder.
##########################################################################
##
Flashing Mellanox Firmware for HCA Device ID : mt25218_pciconf0
Max FWVer: 5.1.400 Will be burn.
Upgrading HCA firmware 5.2.0 to 5.1.400
This Will Flash HCA with Firmware file .\Image\fw-25218-5_2_0-mhea28-xtc_a1-
a2.bin
Please do not interrupt the burn process or reboot the machine...
Wait till burn completes ....................................
----------------------------------------------------------------------
The firmware on one or more of the HCAs has been upgraded.
```

```
It is recommended to reboot the machine in order for changes to take effect.
----------------------------------------------------------------------
```

3.   **When the update completes, press Enter to exit the update script.**

4.   **Reboot the Windows server to bring HCAs up.**

You have to reboot the Windows server whenever you run the script and burn firmware on one or more HCAS. If HCAs have been updated, this reboot is required to bring them online with the new firmware.

Configuring Host Drivers for SAN Boot

These topics describe how to configure the host drivers for your Windows server.

- "SAN Boot Installation Requirements" on page 27
- "Creating a SAN-Bootable Image (Windows 2012 R2)" on page 28
- "Creating a SAN-Bootable WinPE RAM Disc (2008 R2)" on page 31
- "SAN Boot Windows Hosts Without PE (Windows 2008 R2 and Windows 2012 R2)" on page 35
- "SAN Installation for Windows 2012 R2, Windows 2008 R2, and Windows 2003" on page 40

Related Information

- "Preparing for Host Driver Configuration" on page 9
- "Configuring Host Drivers for Local Boot" on page 15

SAN Boot Installation Requirements

Before you begin the SAN boot configuration process, you need:

- CDs or installation files for the supported Windows OS version
- CD or an unzipped archive of the host driver software
- WinPE for a preliminary boot of the host server

  Use the WinPE 3.0 included with the Windows 7 Automated Installation Kit 3.0. For information about creating the WinPE disk, see *"Creating a SAN-Bootable WinPE RAM Disc (2008 R2)" on page 31*.

  If you create a custom WinPE disk for your installations, you must include the Oracle Virtual Networking host drivers so that you can see the VNICs and VHBAs. See, "Creating the WinPE RAM CD" on page 32.

When configuring a Windows server to boot over an Oracle Fabric Interconnect VHBA, consider the following:

- Each server requires read/write access to its own dedicated boot volume. Servers cannot share boot volumes.
- You place a fully configured operating system image, including the host drivers, on the SAN volume.

Related Information

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Creating a SAN-Bootable Image (Windows 2012 R2)

These topics describe how to create a SAN-bootable image for the Windows Server 2012 R2 host by using another Windows host to form the image and restore the backup to the VHBA LUN volume.

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▼ Create a Backup Image for Booting

This procedure assumes the following:

- There is a Windows host with a local hard drive.
- The HCA installed on the Windows host has firmware and boot ROM appropriate for the Windows Server 2012 R2 host drivers.
- You have the Windows 2012 R2 DVD.

1. **Install the `xt_init_depth.sh` script on the Oracle Fabric Interconnect before attempting SAN boot.**

   The `xt_init_depth.sh` script is available from your authorized Oracle Service Provider.

2. **Install Windows Server 2012 R2 to the local disk of the Windows host.**

   Do not attempt to install the OS to the SAN LUN.

3. **Download and install the 5.2.2-WIN host drivers to the local disk of the Windows host and reboot as required.**

4. **Install the Windows Server Backup utility from the Add/Remove Roles and Features section of the Server manager.**

5. **On the Oracle Fabric Interconnect, create a server profile for the physical server you plan to SAN boot.**

6. **Add a VHBA with one LUN to the server profile.**

   The LUN should be large enough to contain the OS and applications you intend to install.

7. **Bind the server profile to the server that requires SAN boot.**

   `set server-profile` *name* `connect` *hostname@fabric-interconnect-name:server-port*

   where:

name	Identifier of the server profile
hostname	Host name of the server to SAN boot
fabric-interconnect-name	Identifier of the Oracle Fabric Interconnect to moderate the SAN boot
server-port	Port of the Oracle Fabric Interconnect attached to the server to SAN boot

8. **On the Windows host, start Windows Server Backup from Admin Tools.**

9. **Select Local Backup.**

10. **In the Actions panel, double-click Backup Once.**

11. **Select Different options and click Next.**

12. **Select Custom and click Next.**

13. **Select the following items and click OK.**

    - Bare metal recovery
    - System state
    - System Reserved
    - Local disk (C:)

14. **Select the backup destination and click Next.**

    The backup destination can be a different drive on the local host, or a remote drive.

15. **Confirm the operation and click Backup.**

    The backup progress is displayed.

16. **When the backup is finished, click Close.**

▼ Restore the Backup to the VHBA LUN Volume

1. **Install the `xt_init_depth.sh` script on the Oracle Fabric Interconnect before attempting SAN boot.**

2. **Format the newly added VHBA LUN and make it an active partition.**

   It is assumed the drive letter for the LUN will be h. If it is not, you must modify the `fixbcd.cmd` and `fixregistry.cmd` files used in Step 15 and Step 16.

3. **On the Windows host, start Windows Server Backup from Admin Tools.**

4. **Select Local Backup.**

5. **In the Actions panel, double-click Recover.**

6. **Select where you want the backup stored, and click Next.**

7. **(Optional) Specify the host and path where the backup is located, and click Next.**

8. **Select Files and folders and click Next.**

9. **Select the System Reserved folder and click Next.**

10. **Select Another location and click Browse.**

11. **Browse to the VHBA LUN volume, select it, and click OK.**

12. **Click Next, confirm the operation, and then click Recover.**

    The recovery progress is displayed.

13. **When the recovery completes, click Close.**

14. **Repeat Step 4 through Step 12 to recover the `C:` folder.**

15. **As the admin user of the Windows host, open a command window.**

16. **Edit the boot configuration data for the SAN boot volume.**

    Note - If the VHBA LUN drive letter is not h, you must modify the `fixbcd.cmd` file to accommodate the actual VHBA LUN drive letter.

    `hostdrivers_windows_5.2.2-WIN_FREE\xsigos-5.2.2.4\xsigo\fixbcd.cmd`

17. **Update the registry settings for the SAN boot volume.**

Note - If the VHBA LUN drive letter is not `h`, you must modify the `fixregistry.cmd` file to accommodate the actual VHBA LUN drive letter.

`hostdrivers_windows_5.2.2-WIN_FREE\xsigos-5.2.2.4\xsigo\fixregistry.cmd`

18.   **Complete the SAN boot process.**

Creating a SAN-Bootable WinPE RAM Disc (2008 R2)

Review and perform these topics to create a SAN-bootable WinPE RAM CD.

- "WinPE Overview" on page 31
- "Download the Windows 7 Automated Installation Kit" on page 32
- "Creating the WinPE RAM CD" on page 32

Related Information

- "Creating a SAN-Bootable Image (Windows 2012 R2)" on page 28
- "SAN Boot Windows Hosts Without PE (Windows 2008 R2 and Windows 2012 R2)" on page 35

WinPE Overview

With Windows SAN boot, you can use either WinPE disc or Windows Deployment Service (WDS). WinPE is a scaled-down version of a Windows operating system that provides enough functionality to allow the Windows host server to boot, so that Oracle Virtual Networking host drivers are installed. For more information about WinPE and a WinPE disc, see Microsoft's web site.

When you create the WinPE disc, you load the host drivers in PE so that you can access the virtual resources (VNICs and VHBAs).

Note - If you flash the HCA firmware and Option ROM in the Windows Preboot environment (PE), be aware that you must use the 32-bit PE. The reason for this requirement is that the tools to burn the PE image are 32-bit only. If you use a 64-bit PE system, you cannot burn the PE image, because a 64-bit PE has no 32-bit subsystem where the tools (which are 32-bit) will run.

The overall steps to create a SAN bootable WinPE RAM CD are as follows:

- Obtain the freeware WAIK 3.0 package from Microsoft.

- Obtain the `loaddriver.bat` file.
- Create the WinPE RAM CD with Oracle Virtual Networking host drivers.

    For Windows SAN Boot, WinPE 3.0 is recommended.

▼ Download the Windows 7 Automated Installation Kit

The Windows 7 Automated Installation Kit (WAIK) enables the creation of a bootable WinPE disc.

1. **Download WAIK from Microsoft's web site.**

    http://www.microsoft.com/download/en/details.aspx?id=5753

2. **Install it on any supported Windows system having a CD/DVD ROM burner installed.**

    This system becomes the Technician PC and writes the PE image onto the CD.

3. **After installing WAIK, read Microsoft's "Getting Started Guide" for WAIK, as well as any README file(s) that accompanied WAIK for information about system requirements, known issues, and so on.**

Creating the WinPE RAM CD

These topics describe how to create a bootable WinPE CD with WAIK.

- "Prerequisites for Creating the WinPE RAM CD" on page 32
- "Create the WinPE RAM CD" on page 33
- "Add Scripting Capability to the WinPE CD" on page 35

Note - By default, the WinPE environment does not allow running visual basic scripts. If you need to run scripts in WinPE (for example, to update the Option ROM on the HCA), you add scripting capability to the WinPE CD. For information, see *"Add Scripting Capability to the WinPE CD" on page 35*.

Prerequisites for Creating the WinPE RAM CD

The prerequisites for creating the WinPE RAM CD are as follows:

- WAIK, Windows Automated Installation Kit for Windows 7. See "Download the Windows 7 Automated Installation Kit" on page 32.

- CDBurn or DVDBurn (or other compatible burning utility), which allows burning a DVD from an ISO image.
- Technician PC, which is a Windows compatible workstation or PC with a CD/DVD ROM Drive (RW capable) with Windows AIK installed on it.
- A blank CD or DVD, which is used to create the bootable WinPE RAM CD.
- The `loaddrivers.bat` file, which must be downloaded from the Xsigo FTP site. You will need a valid user name and password to access the file.

▼ Create the WinPE RAM CD

1. Type the following command from the WinPE tools command prompt:

```
copype.cmd x86 c:\winpe_x86
```

2. Open the Windows AIK command prompt.

3. Change the directory to `c:\winpe_x86\iso\sources.`

4. Copy `winpe.win` to `boot.wim.`

```
copy C:\Program Files\Windows AIK\Tools\PETools\x86\winpe.wim c:\winpe_x86\iso\
sources\boot.wim
```

5. Create the `mount` directory.

```
md c:\winpe_x86\iso\sources\mount
```

6. Mount and edit the `boot.wim` file.

```
dism /mount-wim /wimfile:c:\winpe_x86\iso\sources\boot.wim /index:1
/mountdir:mount
```

7. Copy the utilities needed to perform the required tasks in WinPE.

For `imagex.exe`:

```
copy C:\Program Files\Windows AIK\Tools\x86\imagex.exe C:\winpe_x86\iso\
sources\mount\windows
copy C:\Program Files\Windows AIK\Tools|petools\x86\bootsect.exe C:\winpe_x86\
iso\sources\mount\windows\
```

You use `imagex.exe` as a tool when the server is booted into WinPE. You use `dism.exe` to build the PE disc.

8. Log in to the Oracle FTP site, and download the `loaddrivers.bat` file to the following directory on the local server.

```
C:\winpe_x86\iso\sources\mount\
```

9. **Copy the device diagnostic tool to the mounted image.**

   ```
   copy c:\xsigos-3.0.0-whql\xsigo\xginstdev32.exe C:\winpe_x86\iso\sources\mount\
   ```

10. **Create a temporary folder to save the WinPE driver package for your environment.**

    For example, a `PEdrivers` folder.

    ```
    md C:\winpe_x86\iso\sources\mount\PEdrivers
    ```

11. **Copy the WinPE driver package appropriate for your environment into the root of the mounted image.**

    ```
    copy c:\xsigos-3.0.0-whql\xsigo\pedrivers\san-install\x86\*.* C:\winpe_x86\iso\
    sources\mount\PEdrivers\
    ```

12. **(Optional) You can add scripting capability, which allows scripts to be executed in the WinPE environment.**

    If you are adding scripting capability to the WinPE disc, do so before burning the WinPE image onto the physical medium (CD or DVD). See .

13. **Unmount the mounted WIM image.**

    ```
    dism /unmount-wim /mountdir:C:\winpe_x86\iso\sources\mount
    /commit
    ```

14. **Create the ISO image for the bootable disc.**

    ```
    oscdimg -n -bC:\winpe_x86\etfsboot.com C:\winpe_x86\iso C:\winpe_x86\
    winpe_x86.iso
    ```

15. **Burn the ISO file to a DVD or CD-ROM:**

    - DVD

      ```
      dvdburn d: C:\winpe_x86\winpe_x86.iso
      ```
    - CD-ROM

      ```
      cdburn d: C:\winpe_x86\winpe_x86.iso
      ```

16. **Boot into WinPE and execute the Oracle-provided `loaddrivers.bat` file from the root of `X:`.**

    When the server is booted into the WinPE image, the root of `x:` should contains the following:

    - `Xginstdev32.exe`
    - `loaddrivers.exe`
    - PE drivers folder containing the Xsigo WinPE host drivers

▼ Add Scripting Capability to the WinPE CD

In some situations, you will need to run visual basic (`.vbs`) scripts in the Windows preboot environment. For example, you might need to run the firmware update script to update the option ROM on an HCA in your Windows server. By default, WinPE does not support `.vbs` functionality. So, if you want to be able to execute a script, you add scripting capability to the WinPE disc that you are creating.

Adding scripting capability is not mandatory for a standard WinPE disc. If you do not explicitly add this functionality, you cannot run scripts from the WinPE disc. In a Windows SAN Boot environment, this is a serious drawback due to not being able to update Option ROM firmware.

Note - If you are adding scripting capability to the WinPE disc, do so before burning the WinPE image onto the physical medium (CD or DVD).

Assuming you have completed Step 1 through Step 11 in the *"Create the WinPE RAM CD" on page 33* procedure, you can add scripting capability by performing the following steps:

1. **Mount the `boot.win` image if it is not already mounted.**

   ```
   dism /mount-wim /wimfile:c:\winpe_x86\iso\sources\boot.wim
   /index:1 /mountdir:c:\winpe_x86\iso\sources\mount

   dism /image:c:\winpe_x86\iso\sources\mount /Add-package
   /PackagePath:"C:\Program Files\Windows AIK\Tools\PETools\x86\WinPE_FPs\winpescripting.
   cab"
   dism /image:c:\winpe_x86|iso\sources\mount /Add-package
   /PackagePath:"C:Program Files\WindowsAIK\Tools\PETools\x86\WinPE_FPs\winpewmi.
   cab"
   ```

   Note - If you type the command and mount an already mounted `boot.win`, an error message is displayed. You can ignore the error as it does not affect the procedure.

2. **Return to Step 13 of the *"Create the WinPE RAM CD" on page 33* procedure to complete creation of bootable disc.**

SAN Boot Windows Hosts Without PE (Windows 2008 R2 and Windows 2012 R2)

SAN boot is supported through multiple ways on different versions of the Windows OS. These topics describe how to SAN boot a server by using the shadow copy. Shadow copy is a part of

the volume shadow copy service (VSS) which is included in the Windows server 2008 R2 OS. With Shadow copy, you can take a snapshot of the data on a specific local volume on the server. After the volume is captured, you can place it on the appropriate SAN LUN as needed.

SAN Boot Without PE on Windows Hosts Overview

Planning the SAN boot without PE has the consists of the following steps:

1. Create the correct batch files and scripts on the server.

   The following user-configured files are created:

   - `fixbcd.cmd`
   - `fixregistry.cmd`
   - `fixbootsector_W2k8.cmd`
   - `removescript.script`

   To support these files, the following standard Windows files are required. Make sure that they are available on the server.

   - `Bootsect.exe`
   - `Imagex.exe`
   - `bcdboot.exe`
   - `diskshadow.exe`
   - `reg.exe`
2. Copy the boot image onto the SAN LUN.
3. Create a SAN bootable server profile that connects the server to the SAN LUN where the boot image exists.
4. Edit the server's BIOS to set the Oracle VHBA as the boot device.

   By doing so, the server will retrieve the OS from the SAN LUN and boot to runtime.

SAN Boot Considerations

Consider the following when you configure SAN Boot with a shadow copy for Windows:

- The server will no longer be able to boot to either safe mode or the recovery console.

- The SAN LUN must use either master boot record (MBR) or GUID partition table (GPT) partitioning. Dynamic disks are not supported with Oracle Virtual Networking host drivers.
- If you are SAN booting multiple servers, you perform this procedure once for each of the servers. Also, each server must have its own SAN LUN and its own bootable VHBA connected to it. You cannot connect the server to the same SAN LUN and have all servers boot from a common boot image on a central SAN LUN.

▼ Configure SAN Boot With a Shadow Copy

This procedure describes how to convert an existing server that boots from its local drive to a SAN-booted server. After the server is converted, the server's local hard drive is not used to boot the server to its OS. In fact, the drive must be completely disabled. No local disks should be available as boot devices when the conversion is complete.

To convert an existing server that locally boots from hard disk to a SAN boot system, you will perform various parts of this procedure on the server and Oracle's Fabric Interconnect.

Note - This procedure assumes that one partition is used on one disk.

If multiple partitions are created on the disk, capturing the image is more complex. You will have to modify the tools listed below to capture both the small boot partition where the BootMGR and boot configuration database (BCD) exist as well as capturing the partition where the OS is installed.

For this procedure, assume that the SAN LUN is `h:`.

Note - This procedure is written for Windows 2008 R2, but is also valid for Windows 2012. However, you might need to change file names based on the OS type for certain steps.

1. **On the server, install the OS to a local disk in the server.**
   Do not attempt to install the OS to the SAN LUN.

2. **Install the host drivers and reboot as required.**
   If needed, update the HCA firmware and Option ROM to the correct version for your hardware type. See, "Confirm the OS Version" on page 12.

3. **On the Oracle Fabric Interconnect, add a server for the physical server you plan to SAN boot.**

   ```
   add server-profile webapps1
   ```

4. **Add a VHBA with one LUN to your server profile.**
   The LUN should be the appropriate size to contain the OS and applications you intend to install.

```
add vhba vh1.webapps1 8/1
```

5.   **Build the server profile to the server by using the `set server-profile` *name* `connect` *hostname@director-name:ServerPort* command.**

```
set server-profile webapps1 connect webserver1@Director1:ServerPort18
```

Note - Because the host drivers are already installed (see Step 2), the host is identifiable by the host name, as shown in the example. If you need to find the port on which the server is connected, you can type the show `fabric-port` command, and scroll to find the connection for the relevant host.

---

6.   **On the server, using Disk Manager, bring the newly added disk online.**

7.   **Using Disk Manager, format the disk and mark it Active.**

8.   **Using a text editor, create the `backupscript.cmd` file.**

9.   **In the `backupscript.cmd` file:**

```
diskshadow.exe /s backupscript.script
```

When this script runs, it captures the local disk and places a copy onto the LUN.

10.   **Create the `backupscript.script` file with the following content.**

```
SET CONTEXT PERSISTENT NOWRITERS
SET VERBOSE ON
BEGIN BACKUP
ADD VOLUME C: ALIAS systemVolumeShadow
CREATE
EXPOSE %systemVolumeShadow% p:
EXEC w2k8_clone_diskshadowImage.cmd
END BACKUP
```

11.   **Create the `w2k8_clone_diskShadowImage.cmd` file with the following content.**

```
imagex.exe /CAPTURE /boot P: c:\SanBoot.wim "Windows Server 2008 R2"
format.com h: /q /V:Sanboot /y
bootsect.exe /nt60 h: /force
imagex.exe /APPLY c:\SanBoot.wim 1 H: /VERIFY
diskshadow.exe /s removescript.script
call FixBCD.cmd
call FixBootSector-2k8.cmd
call fixregistry.cmd
```

Note - For Windows 2012 R2, use the file name w2k12_clone_diskShadowImage.cmd.

---

12. **Delete the existing BCD on the SAN LUN.**

    ```
    delete h:\Boot\BCD
    ```

13. **Create a new BCD on the SAN LUN.**

    ```
    bcdboot.exe c:\Windows /s h:
    ```

    This executable creates a new BCD on the LUN and forces the new configuration information into the new BCD.

14. **Create the `FixBCD.cmd` file with the following content.**

    ```
    bcdedit.exe -store h:\boot\bcd /set {bootmgr} device boot
    bcdedit.exe -store h:\boot\bcd /set {default} device boot
    bcdedit.exe -store h:\boot\bcd /set {default} osdevice boot
    ```

    When this file is executed, it updates the boot database with the new boot partition information.

15. **Create the `fixbootsector_W2k8.cmd` file with the following content.**

    ```
    bootsect.exe /nt60 h: /force
    ```

    When this file is executed, it places the boot sector on the new LUN.

16. **Create the `fixregistery.cmd` file with the following content.**

    ```
    reg.exe load hklm\sanboot h:\windows\system32\config\system
    reg.exe delete hklm\sanboot\mounteddevices /va /f
    reg.exe unload hklm\sanboot
    ```

    When this file is executed, it removes any previously assigned drive letters. If the old drive letters are not removed, the system will boot to the h: drive. If the local disk controller had more than just the boot information and the OS, any additional drive letters will have to be reassigned once the server boots to SAN.

17. **Create the `removescript.script` file with the following content.**

    ```
    delete shadows exposed p:
    ```

18. **On the Oracle Fabric Interconnect, make the server profile SAN Bootable, by setting the `san-boot` flag for the server profile.**

    Use the set server profile *name* san-boot *VHBA WWPN LUN ID* command.

    ```
    set server-profile webapps1 san-boot vh1.webapps1 11:22:33:44:55:66:77:88 1
    ```

19. **Reboot the server and interrupt the POST to enter the BIOS configuration utility.**

20. **Remove the local disk from the boot devices list by disabling the on-board storage device.**

If disabling the on-board storage is not preferable, you can remove the physical hard drive(s) from the server, but be aware that some array controllers behave unpredictably if the drives are removed.

21.   Set the HCA high enough in the boot devices list order to enable the Option ROM to complete before another device is considered for booting the server.

22.   Save the settings and exit the BIOS.

The next time the server boots, it uses the bootable VHBA.

23.   If you are converting multiple servers from local boot to SAN boot, repeat this procedure as needed for each server.

Note - The sysprep.exe tool is not supported for this method of SAN Booting Windows Server 2008 R2 or 2012 R2 hosts.

SAN Installation for Windows 2012 R2, Windows 2008 R2, and Windows 2003

These topics describe how to perform a SAN install for your version of Windows and also describes how to upgrade host drivers from 5.2.1-WIN to 5.2.2-WIN.

▼ Install SAN (Windows Server 2012 R2 and 2008 R2)

In this procedure you will inject Windows server 2012 R2 host drivers into the Windows server 2012 R2 DVD image. This procedure assumes the following:

- There is either a Windows 8.1 or Windows 2012 R2 host with a local hard drive.
- PowerShell is installed on the Windows host.

Note - PowerShell is not supported by Windows 2008 R2.

- The Windows Automated Installation Kit is installed on the Windows host.

- You have the Windows Server 2012 R2 DVD.
- You have downloaded the Windows host drivers version 5.2.2-WIN to the Windows host.

Note - You must have installed the `xt_init_depth.sh` script on your Oracle Fabric Interconnect before attempting SAN boot for Windows Server 2012 R2.

1. **Browse the admin user of the Windows host.**

2. **Create the temporary folders.**

   - For Windows 2012 R2:
     - `C:\Temp\win2012r2`
     - `C:\Temp\300`
     - `C:\temp_mount`
   - For Windows 2008 R2:
     - `C:\Temp\win2008r2`
     - `C:\Temp\300`
     - `C:\temp_mount`

3. **Copy the contents of the Windows server 2012 R2 DVD to `C:\Temp\win2012r2` and the contents of the Windows Server 2008 R2 DVD to `C:\Temp\win2008r2`.**

4. **Unzip the `hostdrivers_windows_5.2.2_FREE.zip` file and copy the file structure into `C:\Temp\300`.**

5. **Navigate to `C:\Temp\300\hostdrivers_windows_5.2.2-WIN_FREE\ xsigos-5.2.2.4\xsigo \PEdrivers\`.**

6. **Run the `XsigoPkgAddToW2k8_to_W2k12R2_DVDImage.bat` file in PowerShell with the appropriate arguments.**

   The batch file has the following syntax:

   XsigoPkgAddToW2k8_to_W2k12R2_DVDImage.bat *win2012r2 path-to-DVD-contents path-to-drivers driver-folder-name path-to-WAIK temporary-mount-point* where:

win2012r2	OS DVD folder location. This folder must have write access for the current user.
path-to-DVD-contents	File path to the DVD that contains the modified OS image.
path-to-drivers	Path to the host drivers.
driver-folder-name	Path to the folder on the DVD where the host drivers exist.

path-to-WAIK	Full file system path to the location of the Windows Automated Installation Kit.
temporary-mount-point	Temporary mount point for the batch file to use.

For example:

```
XsigoPkgAddToW2k8_to_W2k12R2_DVDImage.bat win2012r2 C:\Temp\win2012r2 C:\Temp\
300\xsigos-5.2.2.2 xsigos-5.2.2.2 "C:\Program Files\WindowsAIK" C:\temp_mount
```

7.   Verify that the command runs without any errors.

Press any key if the command seems to be taking a while or not responding.

8.   Perform the steps to upload the DVD image to a WDS server, and complete the OS installation.

▼ Upgrade Host Drivers From 5.2.1-WIN to Host Driver 5.2.2-WIN

Upgrading host drivers from 5.2.1-WIN to 5.2.2-WIN is supported only for Windows 2012 R2 SAN booted hosts. If you want to upgrade on a locally booted host, then you might have to uninstall and reinstall the host drivers.

1.   Download the host driver 5.2.2-WIN.

See "Downloading the Host Drivers" on page 13.

2.   Copy the host driver 5.2.2-WIN to the SAN-booted hosts.

3.   Unzip the `.zip` file.

4.   Navigate to `hostdrivers_windows_5.2.2-WIN_FREE\xsigos-5.2.2.4\ xsigo\`.

5.   Run the `Update_SAN_Drivers.vbs` script in PowerShell to update the drivers.

6.   Reboot the SAN-booted Windows 2012 R2 server twice to complete the installation procedure.

Glossary

BCD	Boot configuration database.
BIOS	Basic input/output system.
BootMGR	Boot manager. It is used to start the Windows operating system.
FTP	File Transfer Protocol.
GPT	GUID partition table.
GUID	Globally unique identifier.
HCA	Host channel adapter.
host	Host is the part of the server module that works with the CPU and other hardware to run the OS and other applications.
IB Stack	InfiniBand stack. InfiniBand is an I/O technology based on switched fabrics. It provides high bandwidth, low latency interconnect for attaching I/O devices to hosts and for host-to-host communication.
IP	Internet Protocol.
iSCSI	Internet small computer system interface.
ISO	ISO image file format.
LUN	Logical unit number.
MBR	Master boot record.
Option ROM	Option ROM contains a small footprint of the OVN drivers that is needed to bring up the vNIC's and vHBA's at remote boot time.
Oracle Fabric Interconnect	The Oracle Virtual Networking directors that connect the IB to the hosts and virtualizes their I/O.
POST	Power-on self-test.

PXE	Preboot execution environment.
SAN	Storage area network.
SATA disk	Serial advanced technology attachment disk. This computer bus interface connects the host bus adapters to the hard disk.
server profile	Server profile is a virtual container that binds to a host. It contains virtual NIC's and virtual HBA's.
VHBA	Virtual host bus adapter.
VNIC	Virtual network interface controller.
VSS	Volume shadow copy service.
WAIK	Windows automated installation kit.
WDS server	Windows deployment services. WDS is a server technology used for installing Windows operating systems over a network.
WIM	Windows image management. WIM is used to create, distribute and install compressed disk image files for Windows servers.
Windows Server Backup Utility	Windows server backup utility provides backup and recovery solutions for Windows servers.
WinPE	Windows preinstallation environment.
WWPN	World wide port name.
XgOS	XgOS is the operating system that works on the Oracle Fabric Interconnect.

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