

**Test Lab Guide: Demonstrate Windows Server "8" Beta** **High Availability Printing**

Microsoft Corporation

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**Abstract**

This paper contains an introduction to Windows Server "8" Beta Printing and step-by-step instructions for extending the Test Lab Guide Base Configuration to demonstrate High Availability Printing.

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# Introduction

Print and Document Services in Windows Server "8" Beta enables you to share printers on a network and centralize print server and network printer management tasks by using the Print Management Microsoft Management Console (MMC) snap-in. Print Management helps you monitor print queues and receive notifications when print queues stop processing print jobs. It also enables you to migrate print servers and deploy printer connections using Group Policy.

In contrast to previous versions of Windows Server, Windows Server "8" Beta defines a highly available print server as a virtual machine running on a Microsoft Hyper-V Hypervisor server cluster. A single virtual machine with the Print Server role installed can then be migrated from one Hyper-V server cluster node to the other using either manual or automatic methods.

In Windows Server "8" Beta, the print spooler service is no longer a clustered resource and instead the entire virtual machine is migrated from one Hyper-V server to the other. This new model provides the same seamless user experience as previous versions of Windows but with the following added benefits:

* Windows Server "8" Beta Print Servers can utilize the Live Migration and Quick Migration features of Hyper-V
* Using Windows Server "8" Beta as the Hyper-V and failover clustering host allows access to the new VM Monitoring feature
* Windows Server "8" Beta Highly Available Print Servers are easier to deploy and have reduced complexity
* An HA Print Server can now be deployed on Server Core editions of Windows
* Problems with print devices and drivers that were not designed to work in a server cluster environment and now greatly reduced, if not completely eliminated
* Backup, restore, and migration of Highly Available Print Servers is greatly simplified

## In this guide

This paper contains instructions for setting up a test lab based on the Test Lab Guide Base Configuration and deploying a highly available Windows Server "8" Beta Print Server using three server computers and one client computer. The resulting High Availability Printing test lab demonstrates Windows Server "8" Beta Print Server functionality.

Important

The following instructions are for configuring a Windows Server "8" Beta High Availability Printing test lab using the minimum number of computers. Individual computers are needed to separate the services provided on the network and to clearly show the desired functionality. This configuration is neither designed to reflect best practices nor does it reflect a desired or recommended configuration for a production network. The configuration, including IP addresses and all other configuration parameters, is designed only to work on a separate test lab network.

Attempting to adapt this Windows Server "8" Beta High Availability Printing test lab configuration to a pilot or production deployment can result in configuration or functionality issues. To ensure proper configuration and operation for your pilot or production Windows Server "8" Beta deployment, use the information in the Windows Server "8" Beta Printing Design Guide for planning and design decisions and the Windows Server "8" Beta Printing Deployment Guide for the steps to properly configure the Windows Server "8" Beta Print Servers and supporting infrastructure servers.

## Test lab overview

In this test lab, Windows Server "8" Beta High Availability Printing is deployed with:

 One computer running Windows Server "8" Beta named DC1 that is configured as an intranet domain controller, Domain Name System (DNS) server, and a Dynamic Host Configuration Protocol (DHCP) server.

* Two intranet member servers running Windows Server "8" Beta named HA-PRN1 and HA-PRN2 that are configured as Hyper-V servers with the Failover Clustering feature installed.
* One intranet member server running Windows Server "8" Beta named APP1 that is configured as an iSCSI Target Server.

 One intranet member server virtual machine running Windows Server "8" Beta named PRN-SRV that is configured as a Print Server.

 One roaming member client computer running Windows 8 Consumer Preview named CLIENT1 that is configured as a Windows 8 Consumer Preview client.

The Windows Server "8" Beta High Availability Printing test lab consists of two subnets that simulate the following:

* An intranet network named Corpnet (10.0.0.0/24)
* An intranet network named iSCSI (9.9.9.0/24)

Computers on each subnet connect using a hub or switch. See the following figure.



The test lab instructions demonstrate the installation and configuration of Windows Server "8" Beta High Availability Printing. Windows 8 Consumer Preview functionality is also demonstrated by using a test client to connect to the Windows Server "8" Beta Print Server.

## Hardware and software requirements

The following are required components of the test lab:

* The product disc or files for Windows Server "8" Beta.
* The product disc or files for Windows 8 Consumer Preview.
* One client computer that meets the minimum hardware requirements for Windows 8 Consumer Preview.
* Three Server computers that meet the minimum hardware requirements for Windows Server "8" Beta Hyper-V Server.

# Steps for Configuring the Windows Server "8" Beta High Availability Printing Test Lab

There are eight steps to follow when setting up a High Availability Printing test lab based on the Test Lab Guide Base Configuration.

1. Set up the Base Configuration test lab.

The High Availability Printing test lab requires the Base Configuration test lab as its starting point.

1. Configure APP1 as an iSCSI Software Target.

This software target is used as shared storage to create a Cluster Shared Volume (CSV) for Microsoft Failover Clustering.

1. Install and Configure HA-PRN1 and HA-PRN2.

HA-PRN1 and HA-PRN2 are Windows Server "8" Beta computers that are used as the Hyper-V hosts for the PRN-SRV virtual machine that is made highly available using Microsoft Failover Clustering.

1. Create a Cluster using Failover Cluster Manager

HA-PRN1 and HA-PRN2 are configured as a Hyper-V cluster.

1. Install and Configure PRN-SRV.

PRN-SRV is a Windows Server "8" Beta virtual machine that is used as a Print Server.

1. Configure VM Monitoring for PRN-SRV.

Configure the VM Monitoring feature to monitor the PRN-SRV virtual machine.

1. Configure CLIENT1.

Connect to the shared print queue on PRN-SRV.

1. Simulate a failure of the Print Spooler service on PRN-SRV.

To test the VM monitoring feature, simulate a failure of the print spooler service on PRN-SRV.

1. Demonstrate Windows 8 Consumer Preview Printing using CLIENT1.

Print a test print job to demonstrate Windows Server "8" Beta Print Server features.

**Note**

You must be logged on as a member of the Domain Admins group or a member of the Administrators group on each computer to complete the tasks described in this guide. If you cannot complete a task while you are logged on with an account that is a member of the Administrators group, try performing the task while you are logged on with an account that is a member of the Domain Admins group.

This guide provides steps for configuring the computers of the Remote Desktop Services Desktop Virtualization test lab, configuring Remote Desktop Services, and demonstrating user connections to Virtual Desktop collections. The following sections provide details about how to perform these tasks.

## Step 1: Setup the Base Configuration Test Lab

Set up the Base Configuration test lab for the Corpnet subnet using the procedures in the “Steps for Configuring the Corpnet Subnet” section of the Test Lab Guide: Base Configuration. Connect **DC1, APP1**, and **CLIENT1** to the Corpnet subnet.

## Step 2: Configure APP1 as an iSCSI Software Target

Installation and configuration of the iSCSI Target Server role service consists of the following procedures:

* Configure TCP/IP Properties on APP1
* Install the iSCSI Target Server role service on APP1
* Create iSCSI virtual disks to be used as shared storage for HA-PRN1 and HA-PRN2

PRN-SRV must have two network adapters installed. Connect one adapter to the Corpnet physical or virtual switch, and connect the second adapter to the iSCSI physical or virtual switch.

The following sections explain these procedures in detail.

### Configure TCP/IP Properties on APP1

To configure TCP/IP properties on APP1

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| 1. Click the Desktop tile on the Start screen. Open **Network and Sharing Center** (right-click the network icon in the System Notification Area and select **Open Network and Sharing Center**). In Network and Sharing Center, click the link for **Change adapter settings**.
2. PRN-SRV should have two network interfaces installed. Choose the interface that does not have an IP address already assigned on the 10.0.0.0/24 network, right-click on that interface and then click **Properties**.
3. Click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
4. Select Use the following IP address. In IP address, type 9.9.9.1. In Subnet mask, type 255.255.255.0.
5. Click **OK**, and then click **Close**. Close the **Network Connections** window and **Network and Sharing Center**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. Note that the "Wired Ethernet Connection" interface name may be different on your computer. Use ipconfig /all to list out the interfaces. **netsh interface ipv4 set address "Wired Ethernet Connection" static 9.9.9.1 255.255.255.0** |

### Install the iSCSI Target Server service

To install the iSCSI Target Server role service on APP1

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| 1. In the **Dashboard** console of Server Manager, under **Configure this local server**, click **Add roles and features**.
2. Click **Next** three times to get to the Select server roles screen.
3. In the Select server roles dialog, expand **File and Storage Services**, and then expand **File Services**. Check **iSCSI Target Server** , and then click **Next**.
4. Click the **Add Features** button to install the required **File Server** role service.
5. Click **Next** two times to get to the **Confirm Installation Selections** screen.
6. Click the box next **to Restart the destination server automatically if required** and then click **Install**.
7. Allow the installation to complete, and then click **Close**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. **Add-WindowsFeature FS-iSCSITarget-Server** |

### Create iSCSI virtual disks to be used as shared storage

Two iSCSI virtual disks are needed to provide Failover Clustering with a witness disk and a cluster shared volume.

To create iSCSI virtual disks on APP1

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| 1. Logon to APP1 using the CORP\Administrator account.
2. Server Manager should open automatically. Click **FILE SERVICES** in the navigation pane.
3. Click **iSCSI VIRTUAL DISKS** and then click **Launch the New Virtual Disk wizard to create a virtual disk**.
4. Select **C:** as the Volume and then click **Next**.
5. In the Name: text box, type **Witness** and then click **Next**.
6. Change the Size dropdown to **MB** and then type **500** for the Size, and then click **Next**.
7. **New iSCSI target** will be selected by default, and then click **Next**.
8. On the **Specify target name** page, type **Cluster** for the name and then click **Next**.
9. On the **Specify access servers** page, click the **Add** button.
10. In the **Add Initiator ID** window, select **Enter a value for the selected type**, change Type to **IP Address,** enter **9.9.9.2** as the value, and then click **OK**.
11. Repeat step 9 and 10 and enter **9.9.9.3** as the IP Address value.
12. Click **Next** two times and then click **Create**.
13. Wait until the **View results** page shows **Completed** for all Tasks and then click **Close**.
14. In the Tasks menu, select **New Virtual Disk**.
15. Select **C:** as the Volume and then click **Next**.
16. In the Name: text box, type **CSV** and then click **Next**.
17. Change the Size dropdown to **GB** and then type **20** for the Size, and then click **Next**.
18. Verify that **Existing iSCSI Target** is selected and then click **Next**.
19. Click Create, wait until the **View results** page shows **Completed** for all Tasks and then click **Close.**
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. **New-iSCSIServerTarget -Targetnane "Cluster" -InitiatorID IPAddress:9.9.9.2,IPAddress:9.9.9.3****New-iSCSIVirtualDisk "C:\iSCSIVirtualDisks\Witness.vhd" -Size 50MB** **New-iSCSIVirtualDisk "C:\iSCSIVirtualDisks\CSV.vhd" -Size 20GB****Add-iSCSIVirtualDiskTargetMapping -Targetname "Cluster" -DevicePath "C:\iSCSIVirtualDisks\Witness.vhd"****Add-iSCSIVirtualDiskTargetMapping -Targetname "Cluster" -DevicePath "C:\iSCSIVirtualDisks\CSV.vhd"** |

## Step 3: Install and configure HA-PRN1 and HA-PRN2

Installation and configuration of the servers that will be used for Hyper-V and Failover Clustering consists of the following procedures:

* Install the operating system on HA-PRN1 and HA-PRN2
* Rename HA-PRN1 and HA-PRN2
* Configure TCP/IP properties on HA-PRN1 and HA-PRN2
* Join HA-PRN1 and HA-PRN2 to the CORP domain
* Connect to shared storage on APP1 using iSCSI Initiator
* Install Hyper-V and Failover Clustering on HA-PRN1 and HA-PRN2

HA-PRN1 and HA-PRN2 must have two network adapters installed. Connect one adapter to the Corpnet physical or virtual switch, and connect the second adapter to the iSCSI physical or virtual switch.

The following sections explain these procedures in detail.

### Install the Operating System

Install the operating system on HA-PRN1 and HA-PRN2

To Install Windows Server "8" Beta on HA-PRN1 and HA-PRN2

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| 1. Start the installation of Windows Server "8" Beta.
2. When are you prompted to choose the **Language to install**, **Time and currency format**, and **Keyboard or input method**, accept the default selections, and then click **Next**.
3. Click **Install now**.
4. On the **Enter product key to activate windows** page, type your product key, and then click **Next**.
5. On the **Select the operating system you want to instal**l page, click **Windows Server "8" Beta Datacenter (Server with a GUI)**, and then click **Next**.
6. Select the **I accept the license terms check box**, and then click **Next**.
7. On the **Which type of installation do you want?** page, select **Keep Nothing**.
8. On the **Where do you want to install Windows?** page, select the appropriate volume, and then click **Next**.
9. When you are prompted for a password, type a strong password twice, and then click the right arrow.
10. Click **OK** when the password has been changed.
11. Repeat steps 1-10 above for the computer HA-PRN2.
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### Rename HA-PRN1 and HA-PRN2

Rename RDSH1 and RDSH2 prior to joining the CORP domain.

To Rename HA-PRN1 and HA-PRN2

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| 1. Logon to the computer with the local Administrator user account.
2. In Server Manager, click on **Local Server** in the Navigation pane.
3. In the **PROPERTIES** tile, click on the name of the computer to the right of **Computer name**.
4. On the Computer Name tab, click **Change**.
5. In the Computer name box, type **HA-PRN1** and then click **OK** two times.
6. Click **Close**, and then click **Restart Now**.
7. Repeat steps 1-6 for the HA-PRN2 computer.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. The example below is for HA-PRN1, modify computer name and issue the same command to configure HA-PRN2. **rename-computer HA-PRN1****restart-computer** |

### Configure TCP/IP Properties on HA-PRN1 and HA-PRN2

To configure TCP/IP properties on HA-PRN1

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| 1. Click the Desktop tile on the Start screen. Open **Network and Sharing Center** (right-click the network icon in the System Notification Area and select **Open Network and Sharing Center**). In Network and Sharing Center, click the link for **Change adapter settings**.
2. HA-PRN1 should have two network interfaces installed. Choose the interface that is connected to the iSCSI network, right-click on that interface and then click **Properties**.
3. Click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
4. Select Use the following IP address. In IP address, type 9.9.9.2. In Subnet mask, type 255.255.255.0.
5. Click **OK**, and then click **Close**.
6. Choose the interface that is connected to the Corpnet network, right-click on that interface and then click **Properties**.
7. Click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
8. Select Use the following IP address. In IP address, type 10.0.0.4. In Subnet mask, type 255.255.255.0.
9. Select Use the following DNS server addresses. In Preferred DNS server, type 10.0.0.1.
10. Click **OK**, and then click **Close**.
11. Close the **Network Connections** window and **Network and Sharing Center**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. Note that the "Wired Ethernet Connection" interface name may be different on your computer. Use ipconfig /all to list out the interfaces. **netsh interface ipv4 set address "Wired Ethernet Connection" static 10.0.0.4 255.255.255.0****netsh interface ipv4 set dnsservers "Wired Ethernet Connection" static 10.0.0.1 primary****netsh interface ipv4 set address "Wired Ethernet Connection 2" static 9.9.9.2 255.255.255.0** |

To configure TCP/IP properties on HA-PRN2

|  |
| --- |
| 1. Click the Desktop tile on the Start screen. Open **Network and Sharing Center** (right-click the network icon in the System Notification Area and select **Open Network and Sharing Center**). In Network and Sharing Center, click the link for **Change adapter settings**.
2. HA-PRN1 should have two network interfaces installed. Choose the interface that is connected to the iSCSI network, right-click on that interface and then click **Properties**.
3. Click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
4. Select Use the following IP address. In IP address, type 9.9.9.3. In Subnet mask, type 255.255.255.0.
5. Click **OK**, and then click **Close**.
6. Choose the interface that is connected to the Corpnet network, right-click on that interface and then click **Properties**.
7. Click Internet Protocol Version 4 (TCP/IPv4), and then click Properties.
8. Select Use the following IP address. In IP address, type 10.0.0.5. In Subnet mask, type 255.255.255.0.
9. Select Use the following DNS server addresses. In Preferred DNS server, type 10.0.0.1.
10. Click **OK**, and then click **Close**.
11. Close the **Network Connections** window and **Network and Sharing Center**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. Note that the "Wired Ethernet Connection" interface name may be different on your computer. Use ipconfig /all to list out the interfaces. **netsh interface ipv4 set address "Wired Ethernet Connection" static 10.0.0.5 255.255.255.0****netsh interface ipv4 set dnsservers "Wired Ethernet Connection" static 10.0.0.1 primary****netsh interface ipv4 set address "Wired Ethernet Connection 2" static 9.9.9.3 255.255.255.0** |

### Join HA-PRN1 and HA-PRN2 to the Domain

After HA-PRN1 and HA-PRN2 have been renamed, join each server to the CORP domain.

To join HA-PRN1 to the CORP domain

|  |
| --- |
| 1. Logon to HA-PRN1 with the local Administrator user account.
2. In Server Manager, click on **Local Server** in the Navigation pane.
3. In the **PROPERTIES** tile, click on **WORKGROUP** to the right of **Domain**.
4. Click Change.
5. Select **Domain** under Member of and type **corp.contoso.com** and then click **OK**.
6. When you see a dialog box welcoming you to the corp.contoso.com domain, click OK.
7. Restart HA-PRN1.
8. Repeat steps 1-7 for HA-PRN2.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **add-computer -domainname corp.contoso.com -credential (get-credential) -newname HA-PRN1****restart-computer** |

### Connect to shared storage on APP1 using iSCSI Initiator

HA-PRN1 and HA-PRN2 must connect to the shared storage on APP1 so that it is available for use with Failover Clustering

To connect to shared storage on APP1



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| 1. From the Start screen on HA-PRN1, Search for iSCSI to locate the iSCSI Initiator. Click on the icon to run iSCSI Initiator.
2. Click Yes when asked to allow the service to start automatically at boot.
3. On the Discovery tab, click the Discover Portal button.
4. Type 9.9.9.1 in the IP address or DNS name: box and then click OK.
5. On the Targets tab, click on the name iqn.1991-05.com.microsoft:App1-cluster-target and then click the Connect button.
6. Verify that Add this connection to the list of Favorite Targets is checked and then click OK.
7. Close the iSCSI Initiator by clicking OK.
8. In the Menu Bar of Server Manager, click Tools and then select Computer Management.
9. Under the Storage node in Computer Management (Local), click Disk Management.
10. Right click on each disk that is shown as Offline and select Online.
11. Right click on each disk that is shown as Unknown and select Initialize Disk. Select MBR and then click OK.
12. Right click on each partition that is shown as Unallocated and select New Simple Volume.
13. Select all defaults in the New Simple Volume Wizard to create an NTFS volume, and then click Finish.
14. Repeat steps 1-7 on HA-PRN2. Steps 8-13 only need to be performed once from HA-PRN1.
 |

### Install Hyper-V and Failover Clustering on HA-PRN1 and HA-PRN2

Install the required role services on each server.

To install Hyper-V and Failover Clustering on HA-PRN1

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| 1. In the **Dashboard** console of Server Manager, under **Configure this local server**, click **Add roles and features**.
2. Click **Next** three times to get to the Select server roles screen.
3. In the Select server roles dialog, select **Hyper-V**, click **Add Features** to automatically add the Role Administration Tools, and then click **Next**.
4. On the **Select features** page, select **Failover Clustering**, click **Add Features** to automatically add the Feature Administration Tools, and then click **Next** two times.
5. On the Create Virtual Switches screen, select the Corpnet network interface and then click **Next**.
6. Click **Next** at the **Virtual Machine Migration** page to select default settings.
7. Click **Next** at the **Default Stores** page to accept default paths for virtual machines and virtual hard disks.
8. On the **Confirm installation selections** page, check the box next to **Restart the destination server automatically** **if** required, click Yes to allow automatic restarts and then click **Install**.
9. HA-PRN1 will restart twice in the process of installing Hyper-V and Failover Clustering. After both restarts are finished, logon to HA-PRN1 with the CORP\Administrator account and Server Manager will complete the installation.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **Add-WindowsFeature Hyper-V -IncludeManagementTools****Add-WindowsFeature Failover-Clustering -restart -IncludeManagementTools** |

To install Hyper-V and Failover Clustering on HA-PRN2

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| 1. In the **Dashboard** console of Server Manager, under **Configure this local server**, click **Add roles and features**.
2. Click **Next** three times to get to the Select server roles screen.
3. In the Select server roles dialog, select **Hyper-V**, click **Add Features** to automatically add the Role Administration Tools, and then click **Next**.
4. On the **Select features** page, select **Failover Clustering**, click **Add Features** to automatically add the Feature Administration Tools, and then click **Next** two times.
5. On the Create Virtual Switches screen, select the Corpnet network interface and then click **Next**.
6. Click **Next** at the **Virtual Machine Migration** page to select default settings.
7. Click **Next** at the **Default Stores** page to accept default paths for virtual machines and virtual hard disks.
8. On the **Confirm installation selections** page, check the box next to **Restart the destination server automatically** **if** required, click Yes to allow automatic restarts and then click **Install**.
9. HA-PRN2 will restart twice in the process of installing Hyper-V and Failover Clustering. After both restarts are finished, logon to HA-PRN1 with the CORP\Administrator account and Server Manager will complete the installation.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **Add-WindowsFeature Hyper-V -IncludeManagementTools****Add-WindowsFeature Failover-Clustering -restart -IncludeManagementTools** |

## Step 4: Create a Cluster using Failover Cluster Manager

Creating a cluster and configuring the Cluster Shared Volume consists of the following procedures:

* Create a Cluster using Failover Cluster Manager
* Add iSCSI volume as a Cluster Shared Volume

The following sections explain these procedures in detail.

### Create a Cluster with Failover Cluster Manager

To create a cluster with Failover Cluster Manager



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| 1. Logon to HA-PRN1 using the CORP\Administrator account.
2. On the Start screen, click on Failover Cluster Manager.
3. Click the Create Cluster link in the middle pane of Failover Cluster Manager to launch the Create Cluster Wizard.
4. Click Next and then click the Browse button.
5. Type HA-PRN1; HA-PRN2 and then click OK. After each server is verified and added to the Selected Servers list, click Next.
6. Click Next twice to run the configuration validation tests before creating the cluster.
7. Verify that Run all tests (recommended) is selected and then click Next.
8. On the Confirmation page, verify that HA-PRN1 and HA-PRN2 are listed as the Servers to Test and then click Next.
9. Once the wizard completes all tests and the message The configuration appears to be suitable for clustering is displayed you may proceed to the next step. Click Next.
10. Type HVCLUSTER as the cluster name and then click Next.
11. Uncheck the box next to the 9.0.0.0/8 network and then click in the Address box to the right of the 10.0.0.0/24 network and enter the IP Address of 10.0.0.20, then click Next.
12. On the Confirmation page, look for the text You are ready to create a cluster and then click Next.
 |

### Add a Cluster Shared Volume

To add a Cluster Shared Volume

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| 1. Open Failover Cluster Manager on HA-PRN1 and click the **Storage** node in the navigation pane.
2. Click Cluster Disk 2 and then in the Action pane, select **Add to Cluster Shared Volumes**.
3. Open Hyper-V Manager on HA-PRN1 and click on **Hyper-V Settings** in the Action pane.
4. Click **Virtual Hard Disks** and then click the **Browse** button. Browse to the folder **C:\ClusterStorage\Volume1** and then click **Select Folder**.
5. Click **Virtual Machines** and then click the **Browse** button. Browse to the folder **C:\ClusterStorage\Volume1** and then click **Select Folder**.
6. Click **OK** to close the Hyper-V settings.
 |

## Step 5: Install and configure PRN-SRV

Installation and configuration of the RPN-SRV virtual machine consists of the following procedures:

* Create the PRN-SRV virtual machine
* Install the Operating System
* Rename PRN-SRV
* Join PRN-SRV to the domain
* Install the Print Server role service on PRN-SRV
* Create a shared print queue on PRN-SRV

The following sections explain these procedures in detail.

### Create the PRN-SRV Virtual Machine

To Create the PRN-SRV Virtual Machine

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| 1. Logon to HA-PRN1 using the CORP\Administrator account.
2. On the Start screen, click on Failover Cluster Manager.
3. Expand hvcluster.corp.contoso.com and then click on **Roles**.
4. In the Action pane, click **Virtual Machines**, and then **New Virtual Machine**.
5. Click HA-PRN1 and then click **OK**.
6. Click **Next** and then type **PRN-SRV** as the name of the virtual machine. Verify that the Location is displayed as C:\ClusterStorage\Volume1 and then click **Next**.
7. Type **2048** in the Startup memory box and then click **Next**.
8. Select the Hyper-V network that was created in Step 3 and then click **Next**.
9. On the Connect Virtual Hard Disk page, select **Create a virtual hard disk** and then click **Next**.
10. On the Installation Options page, select **Install an operating system from a boot CD/DVD-ROM** and select either the Physical CD/DVD drive or image file that contains Windows Server "8" Beta, and then click **Next**.
11. Review the selections made in the wizard and then click **Finish** to create the virtual machine.
 |

### Install the Operating System

Install the operating system on PRN-SRV

To install the operating system on PRN-SRV



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| 1. Start the installation of Windows Server "8" Beta.
2. When are you prompted to choose the **Language to install**, **Time and currency format**, and **Keyboard or input method**, accept the default selections, and then click **Next**.
3. Click **Install now**.
4. On the **Enter product key to activate windows** page, type your product key, and then click **Next**.
5. On the **Select the operating system you want to instal**l page, click **Windows Server "8" Beta Beta Datacenter (Server with a GUI)**, and then click **Next**.
6. Select the **I accept the license terms check box**, and then click **Next**.
7. On the **Which type of installation do you want?** page, select **Keep Nothing**.
8. On the **Where do you want to install Windows?** page, select the appropriate volume, and then click **Next**.
9. When you are prompted for a password, type a strong password twice, and then click the right arrow.
10. Click **OK** when the password has been changed.
 |

### Rename PRN-SRV

Rename PRN-SRV prior to joining the CORP domain.

To Rename PRN-SRV

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| 1. Logon to the computer with the local Administrator user account.
2. In Server Manager, click on **Local Server** in the Navigation pane.
3. In the **PROPERTIES** tile, click on the name of the computer to the right of **Computer name**.
4. On the Computer Name tab, click **Change**.
5. In the Computer name box, type **PRN-SRV** and then click **OK** two times.
6. Click **Close**, and then click **Restart Now**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps. The example below is for HA-PRN1, modify computer name and issue the same command to configure HA-PRN2. **rename-computer PRN-SRV****restart-computer** |

### Join PRN-SRV to the Domain

Join the PRN-SRV server to the CORP domain.

To join PRN-SRV to the CORP domain

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| 1. Logon to PRN-SRV with the local Administrator user account.
2. In Server Manager, click on **Local Server** in the Navigation pane.
3. In the **PROPERTIES** tile, click on **WORKGROUP** to the right of **Domain**.
4. Click Change.
5. Select **Domain** under Member of and type **corp.contoso.com** and then click **OK**.
6. When you see a dialog box welcoming you to the corp.contoso.com domain, click OK.
7. Restart PRN-SRV.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **add-computer -domainname corp.contoso.com -credential (get-credential)** **restart-computer** |

### Install the Print Server role service

To install the Print Server role and share a print queue

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| 1. Logon to PRN-SRV using the CORP\Administrator user account.
2. In the **Dashboard** console of Server Manager, under **Configure this local server**, click add **Add roles and features**.
3. Click **Next** three times to get to the Select server roles screen.
4. In the Select server roles dialog, select **Print and Document Services**, click **Add Features** to automatically add the Print and Document Services Tools, and then click **Next**.
5. Click **Next** three time to get to the Select role services screen.
6. Verify that **Print Server** is selected and then click **Next**.
7. Click the box next **to Restart the destination server automatically if required** and then click **Install**.
8. Allow the installation to complete, and then click **Close**.
9. After installation has completed, **Print and Document Services** will appear in the Server Manager navigation pane.
10. Click on Print and Document Services and then click **More** on the notification titled **Configuration required for Print Server PRN-SRV**.
11. Click on **Perform additional configuration** in the Task Details window.
12. Expand **Print Servers** and then **PRN-SRV** in the Print Management Console.
13. Right-click on Printers and select **Add Printer**.
14. Select **Add a TCP/IP or Web Services Printer by IP address or hostname** and then click **Next**.
15. Change the Type of Device to **TCP/IP Device** and Enter **10.0.0.200** into the Host name box and then click **Next**.
16. Select **Install a new driver** and then click **Next**.
17. Select **Microsoft** as the Manafacturer and then **Microsoft XPS Class Driver** under Printers and then click **Next**.
18. Click **Next** two times to accept the default printer name and share name and install the printer.
19. Click Finish to close the Network Printer Installation Wizard.
20. In the Print Management Console, right click on the Microsoft XPS Class Driver printer and select **Properties**.
21. Click the **Sharing** tab and then click the box next to **List in the directory**, and then click **OK**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **Add-WindowsFeature Print-Server****Add-WindowsFeature RSAT-Print-Services****Add-PrinterPort -name Test -PrinterHostAddress "10.0.0.200"****Add-PrinterDriver -name "Microsoft XPS Class Driver"****Add-Printer -name "Microsoft XPS Printer" -DriverName "Microsoft XPS Class Driver" -Shared -ShareName "Microsoft XPS Class Driver" -PortName Test -Published** |

## Step 6: Configure VM Monitoring for PRN-SRV

VM Monitoring for the PRN-SRV virtual machine is configured using Failover Cluster Manager.

Enabling and configuring VM monitoring consists of the following procedures:

* Configure PRN-SRV for VM Monitoring
* Configure HVCLUSTER for to monitor PRN-SRV

The following sections explain these procedures in detail.

### Configure PRN-SRV Firewall to allow VM Monitoring

Enable the VM monitoring firewall exception.

To enable the VM monitoring firewall exception

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| 1. Logon to PRN-SRV using the CORP\Administrator user account.
2. Click on **Local Server** in the Server Manager navigation pane.
3. Click the link **Domain: On** next to **Windows Firewall** to open the firewall control panel.
4. Click **Allow an app or feature through Windows Firewall**.
5. Click the **Change Settings** button.
6. Check the box for Virtual Machine Monitoring and then click **OK**.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **Netsh adv firewall set rule group="Virtual Machine Monitoring" new enable=yes** |

### Configure HVCLUSTER to monitor the PRN-SRV virtual machine

Failover Cluster manager must be configured to monitor the Print Spooler service on PRN-SRV for failures and specific events.

To configure VM Monitoring for PRN-SRV



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| 1. Logon to HA-PRN1 using the CORP\Administrator user account.
2. Run Failover Cluster Manager from the Start screen.
3. Expand HVCLUSTER.corp.contoso.com and then click on Roles.
4. Right click on PRN-SRV virtual machine and select More Actions and then Configure Monitoring.
5. Select the Print Spooler service and then click OK.
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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **Add-clusterVMMonitoredItem -vm "PRN-SRV" -service spooler****Add-ClusterVMMonitoredItem -vm "PRN-SRV" -eventlog "Microsoft-Windows-PrintService/Admin" -eventsource Microsoft-Windows-PrintService -eventid 373** |

## Step 7: Configure CLIENT1

CLIENT1 is already configured to lease an IP Address from the DC1 server and is already a member of the corp.contoso.com domain. CLIENT1 configuration consists of the following procedure:

 Connect to shared printer on PRN-SRV

The following sections explain these procedures in detail.

### Connect CLIENT1 to shared printer on PRN-SRV

Connect the CLIENT1 computer to the shared printer on PRN-SRV that was created in Step 5.

To connect to the shared printer on PRN-SRV

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| 1. On **CLIENT1**, activate the Charms Bar by swiping in the from right edge of a touch screen or mouse to the upper right corner of the display.
2. Click or touch **Settings**, and then **More PC Settings**.
3. Click or touch **Devices**, and then click or touch **Add a device**.
4. Click on **Microsoft XPS Class Driver on PRN-SRV** and the device will install automatically.
 |

## Step 8: Simulate a failure of the Print Spooler service on PRN-SRV

To verify the VM monitoring configuration, simulate a failure of the Print Spooler service and observe the actions taken by the cluster VM monitoring feature.

Testing VM monitoring consists of the following procedures:

* Simulate failure of the Print Spooler process on PRN-SRV
* Verify actions taken by VM Monitoring

The following sections explain these procedures in detail.

### Terminate Print spooler process on PRN-SRV

To terminate the print spooler process on PRN-SRV

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| 1. Logon to PRN-SRV using the CORP\Administrator user account.
2. Type CTRL-ALT-DEL and click **Task Manager**.
3. Click **More Details** to expand the Task Manager view.
4. Click **Spooler SubSystem App** and then click the End Task button. Repeat this process until the PRN-SRV virtual machine shuts down automatically.
 |

### Verify actions taken by VM Monitoring

VM monitoring should intervene and restart the PRN-SRV virtual machine on the third failure.

To verify actions taken by VM Monitoring

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| 1. Logon to HA-PRN1 using the CORP\Administrator user account.
2. Run Failover Cluster Manager from the Start screen.
3. Expand HVCLUSTER.corp.contoso.com and then click on Roles.
4. Click on PRN-SRV and the Status field will update to display (Application in VM Critical) and the PRN-SRV virtual machine will restart automatically.
 |

## Step 9: Demonstrate Windows 8 Consumer Preview Printing using CLIENT1

Use the following procedures to demonstrate Windows 8 Consumer Preview Printing:

 Print a test print job to the PRN-SRV server

The following sections explain these procedures in detail.

### Print a test print job to the PRN-SRV server

The shared print queue in PRN-SRV is configured to use a NULL port so that any jobs sent to it will not print to a real device and not remain in the server side print queue. Open the print queues on both CLIENT1 and PRN-SRV to observe the print job on both machines.

To print a test job to APP1

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| 1. From the **CLIENT1** Start screen, type **Devices** to bring up the Search results. Click **Settings** and then **Devices and Printers**.
2. Double-click on **Microsoft XPS Class Driver on APP1** to open the client-side queue.
3. In Print Management Console on **APP1**, right click on **Microsoft XPS Printer** and select **Open Printer Queue**.
4. Pause the print queue on **APP1** by selecting **Printer** in the queue window and then clicking on **Pause Printing**.
5. From **CLIENT1**, select **Printer** in the queue windows and then select **Properties**.
6. Click the **Print Test Page** button to print a test page to the printer queue on APP1.
7. Observe both the client and server side queues and note the print job is still in both queues.
8. From **APP1**, select **Printer** in the print queue window and then uncheck **Pause Printing** to resume printing.
9. Observe that the print job finishes printing on the server side queue.
 |

### Enable Branch Office Direct Printing

Enabling Branch Office Direct Printing can be accomplished via the Print Management Console or Windows PowerShell. With BODP enabled, the print job will only go to the client side queue before printing.

To enable and test Branch Office Direct Printing

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| 1. From the Print Management Console on PRN-SRV, right click on the Microsoft XPS Class Driver printer and select **Enable Branch Office Direct Printing**.
2. Double-click on **Microsoft XPS Class Driver on PRN-SRV** to open the client-side queue.
3. In Print Management Console on **PRN-SRV**, right click on **Microsoft XPS Printer** and select **Open Printer Queue**.
4. Pause the print queue on **PRN-SRV** by selecting **Printer** in the queue window and then clicking on **Pause Printing**.
5. From **CLIENT1**, select **Printer** in the queue windows and then select **Properties**.
6. Click the **Print Test Page** button to print a test page to the printer queue on PRN-SRV.
7. Observe both the client and server side queues and note the print job only displays in the client side queue and there is no notification that a job has printed on the server side queue.
8. From **PRN-SRV**, select **Printer** in the print queue window and then uncheck **Pause Printing** to resume printing.
9. Observe that the print job finishes printing on the client side queue.
 |

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| Description: Description: Description: http://upload.wikimedia.org/wikipedia/en/7/7f/Windows_PowerShell_icon.png**PowerShell**  |
| The following PowerShell commands perform the same steps: **Set-Printer -name "Microsoft XPS Class Driver" -ComputerName PRN-SRV -RenderingMode BranchOffice** |

# Snapshot the Configuration

This completes the Windows Server "8" Beta High Availability Printing test lab. To save this configuration so that you can quickly return to a working Windows Server "8" Beta Printing configuration from which you can test other Windows Server "8" Beta Printing modular test lab guides (TLGs), TLG extensions, or for your own experimentation and learning, do the following:

1. On all physical computers or virtual machines in the test lab, close all windows and then perform a graceful shutdown.
2. If your lab is based on virtual machines, save a snapshot of each virtual machine and name the snapshot **Windows Server "8" Beta HA Printing**. If your lab uses physical computers, create disk images to save the Remote Desktop Services test lab configuration.

# Additional Resources

For a list of additional Microsoft TLGs, see [Test Lab Guides](http://go.microsoft.com/fwlink/?LinkID=202817) in the TechNet Wiki.

To provide the authors of this guide with feedback or suggestions for improvement, send an email message to tlgfb@microsoft.com.