



Windows Server
2012 R2
Evaluation Guide



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Published: 4 October 2013

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Using This Guide

This guide gives you the necessary information to experience the datacenter built on System Center 2012 R2 and powered by Windows Server 2012 R2. The objective is to help you build an evaluation environment within your own datacenter and walk through the real-world guided experiences described in this guide. In addition to the guided experiences, you'll have the flexibility to expand on the product functionality and learn more based on your business requirements. Where indicated, some of the experiences are interdependent and build on earlier experiences.

Architectural and installation guidance is provided with the minimum hardware requirements for the evaluation environment. It is also possible to follow this guide and change the scenario to your own environment and parameters.

Note: Some of the experiences in this guide have been created to showcase a capability or feature of Windows Server 2012 R2 using methods designed for streamlining the evaluation experience that may not be suitable for production. If you plan to implement these features in production, follow the guidance found in the corresponding pages on [Microsoft TechNet](#).

Navigating the document on your terms

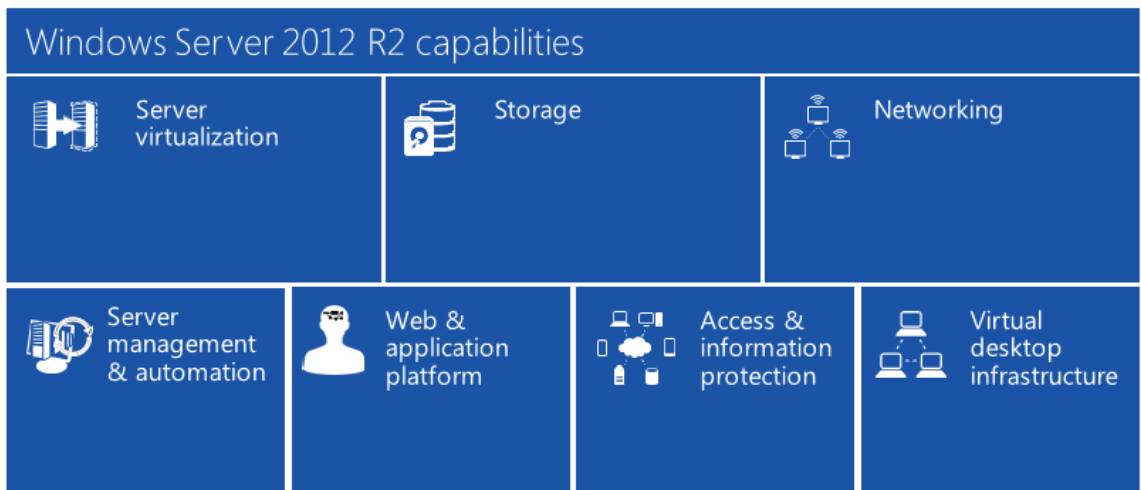
This document is designed to allow you to easily locate the information that is most relevant to you. You will see buttons like the following throughout the guide, which enable you to link quickly to the Table of Contents or the top of the main section you are reviewing.

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Introduction to Windows Server 2012 R2

At the heart of the cloud datacenter, Windows Server 2012 R2 is the operating system that brings Microsoft's experience delivering global-scale cloud services into your infrastructure. Windows Server 2012 powers many of the world's largest datacenters, enables small businesses around the world, and delivers value to organizations of all sizes in between. The latest release includes new features and enhancements across virtualization, storage, networking, and more.



Windows Server helps you build, deploy and scale applications and websites quickly, and with more flexibility than ever before. Together with the Windows Azure public cloud and System Center 2012 R2, it provides improved application portability between on-premises environment, and public and service provider clouds, increasing capacity and effectiveness of your information technology (IT) services.

Windows Server provides a scalable, highly available platform for mission-critical applications and offers enhanced support for open standards, open source applications and various development languages.

Reference Links

[Windows Server 2012 R2](#)

Find core content to evaluate, plan, deploy, manage, troubleshoot, and support servers running Windows Server 2012 operating system

New Features and Highlights

Using the new and enhanced features in Windows Server 2012 R2, you can improve performance and more efficiently use datacenter capacity, helping you increase business agility.

Windows Server delivers resilient, multi-tenant-aware storage and networking capabilities for a wide range of workloads using industry-standard hardware. By automating a broad set of management tasks, Windows Server 2012 simplifies the deployment of major workloads and increases operational efficiencies.

Storage

Organizations face increasingly large amounts of data that must be managed cost effectively. Windows Server helps you maximize your investments by getting better performance from your existing storage area network (SAN) infrastructure. It also delivers the ability to build enterprise-class storage infrastructure with commodity hardware.

Storage Spaces. Windows Server helps reduce costs and improve performance by consolidating standard disks into pools that can be treated as standard drives within the operating system. The logical disks, or Storage Spaces, can be configured for varying resiliency schemes and assigned to different departments. As a result, organizations can simplify isolation and administration of the storage infrastructure and improve performance, flexibility, scalability, and availability. With Windows Server 2012 R2, data is automatically tiered across solid-state drives and hard-disk drives based on usage patterns, to deliver the best performance for data that gets used the most.

Application support with Server Message Block (SMB) 3.0. By separating storage and compute elements of virtual machines, organizations can move virtual machines without impacting storage configurations. Windows Server enables this with SMB file shares for continuous availability using standalone file servers and clustered file servers. Storage can be managed with Storage Spaces and exposed as file shares for Hyper-V virtual machines and SQL databases. With SMB transparent failover, even if one of the nodes goes down, SMB transparently fails over to another node without downtime. Since SMB uses your existing network infrastructure, it also eliminates the need for a dedicated network.

Data deduplication. A new storage efficiency feature of Windows Server 2012 R2 helps reduce file storage requirements through variable-size chunking and compression. Windows Server will automatically scan disks, identify duplicate chunks of data and store those chunks once.

Networking

Networking enhancements in Windows Server 2012 R2 make it easier to virtualize workloads, improve security, provide continuous availability for applications, and get better performance out of existing resources. Networking enhancements also bolster network isolation, which is key to running multi-tenant environments. These enhancements can improve virtual machine density, mobility, and availability.

Comprehensive approach to software-defined networking. Windows Server 2012 R2 delivers several new capabilities for virtualized networks. With multi-tenant virtualization, datacenters can isolate tenant resources without the need for expensive and complex changes to the physical

network infrastructure. Hyper-V Network Virtualization in Windows Server provides a layer of abstraction between the physical networks that support the hosts, and the virtual networks that support the virtualized workloads. As a result, datacenters can handle multiple virtual networks with overlapping IP addresses on the same physical network and also move virtual machines across virtual networks without having to reconfigure the underlying physical network.

Using the multi-tenant Hyper-V Network Virtualization gateway capabilities in Windows Server, you can bridge virtualized networks with non-virtualized networks, service providers and Azure.

Hyper-V extensible switch. Windows Server provides flexibility with advanced packet filtering and routing. The Hyper-V extensible switch offers an open development framework for adding layer-2 functionality such as filtering, monitoring, and packet-level redirection required by the application or tenant.

Network infrastructure enhancements. With automation, networks of virtualized data centers and cloud environments become more agile, dynamically scalable and dispensable, and able to enforce administrative controls. IP Address Management (IPAM) in Windows Server 2012 R2 implements several major enhancements, including unified IP address space management of physical and virtual networks, as well as tighter integration with System Center 2012 R2 Virtual Machine Manager (VMM). The IPAM feature provides granular and customizable role-based access control and delegated administration across multiple data centers. IPAM provides a single console for monitoring and managing IP addresses, domain names, and device identities. It also supports advanced capabilities for continuous availability of IP addressing with Dynamic Host Configuration Protocol (DHCP) failover, DHCP Policies, filters, and more.

Server virtualization

Organizations using Windows Server 2012 R2 gain increased flexibility for managing, moving and replicating virtual machines and attached storage.

Live migration enhancements. Windows Server 2012 R2 delivers significant improvements for moving virtual machines within the infrastructure. Admins can migrate virtual machines simultaneously and use live storage migration capabilities to move the underlying virtual storage while the virtual machine is running. With Shared Nothing Live Migration, administrators gain complete control over virtual machine mobility; using only an Ethernet cable, they can move the running state and the underlying virtual storage. In Windows Server 2012 R2, live migration with compression makes it faster to move virtual machines by compressing virtual machine memory before transferring it over the network. With Live Migration over SMB, the process of live migration can be further accelerated by offloading the traffic processing to multiple RDMA-capable network cards.

Enhanced Hyper-V Replica. Windows Server 2012 Hyper-V introduced a key disaster recovery capability, Hyper-V Replica, for cost-effective virtual machine replication between hosts, datacenters and clouds. In Windows Server 2012 R2, Hyper-V Replica offers more granular

replication frequencies. Organizations can choose from the existing five-minute frequency, a 30-second frequency for near synchronous replication of mission critical workloads, or a 15-minute frequency for less critical workloads. In addition, Hyper-V Replica now supports extended replication, for replicating to a tertiary site, leading to multiple copies of important data and an improved disaster recovery solution.

Online VHDX resize. With Windows Server 2012 R2, admins gain greater flexibility in their ability to configure and manage the storage attached to virtual machines that are running. The online VHDX resize capability enables admins to grow or shrink the virtual disk of a virtual machine without downtime, providing improved flexibility and manageability.

Live virtual machine cloning. In previous releases, admins who wanted to clone a workload first needed to shut down, then, export the virtual machines. With Windows Server 2012 R2, admins can clone virtual machines that are running, including virtual machines with existing checkpoints. These clones are useful for testing scenarios or troubleshooting an issue inside the guest operating system, without the need for downtime.

Server management

New Windows PowerShell capabilities help you automate tasks to save time and effort.

Windows PowerShell 4.0. Every Windows Server administrative operation is now available through the scriptable Windows PowerShell command shell interface. This support enables you to automate repetitive tasks, freeing up resources.

Desired State Configuration. Desired State Configuration (DSC) is a Windows PowerShell management platform that enables you to deploy and manage configuration data for software services and the environment on which these services run. DSC provides a set of Windows PowerShell language extensions, new cmdlets, and resources you can use to specify how you want your software environment configured. It also provides a means for managing existing configurations.

Find out more about how Windows Server helps organizations meet today's datacenter challenges. Here are some of the new and enhanced features in Windows Server 2012 R2:

Storage	Networking	Server Virtualization
<ul style="list-style-type: none">• Storage QoS• Storage Spaces (enhanced to support storage tiering)• Storage tiering• Deduplication for Virtual Desktop Infrastructure (VDI) virtual machines• Resilient File System (ReFS)	<ul style="list-style-type: none">• SMB Direct• Network Interface Card (NIC) teaming• DHCP failover• Extending to Azure• Extending to service providers• Multi-tenant Hyper-V	<ul style="list-style-type: none">• Live migration using compression• Live migration over RDMA• Shared virtual hard disk• Online VHDX resize• Linux support• Hyper-V Recovery Manager

- Storage Management Initiative Specification (SMI-S) provides storage space provisioning for better integration with cluster and System Center 2012 R2 Virtual Machine Manager
 - Network Virtualization gateway
 - IP Address Management
- **Server Management**
 - Windows PowerShell 4.0
 - Desired State Configuration
- Extensible switch
- Multi-tenant Hyper-V Network Virtualization gateway supports network virtualization using Generic Routing Encapsulation isolation
- Virtual machine automatic activation

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Capability Scenarios

Transforming Your Datacenter

This guide walks you through the steps to build a datacenter footprint with virtual machines, along the way pointing you toward a rich set of resources available on the Microsoft TechNet website. The virtual machines you create can be used to explore Windows Server and evaluate the hands-on experiences that bring Windows Server capabilities to life.

As an option, you may choose to reduce the manual configuration effort by downloading a set of Windows PowerShell scripts to help set up the virtual machines.

Windows Server: Architecture of the Evaluation Environment

This evaluation guide helps you explore some of the new capabilities of Windows Server 2012 R2. To navigate through the evaluation experiences, we recommend you build an isolated environment with two physical hosts running Windows Server to host the virtual machines required.

Introduction to the evaluation environment

The following section presents a look at the architecture for the Windows Server evaluation process.

For this evaluation, it is recommended that you use an isolated environment that is not a part of your production network. The evaluation experiences in this guide are designed to be performed on an isolated network as detailed in **Figure 1**

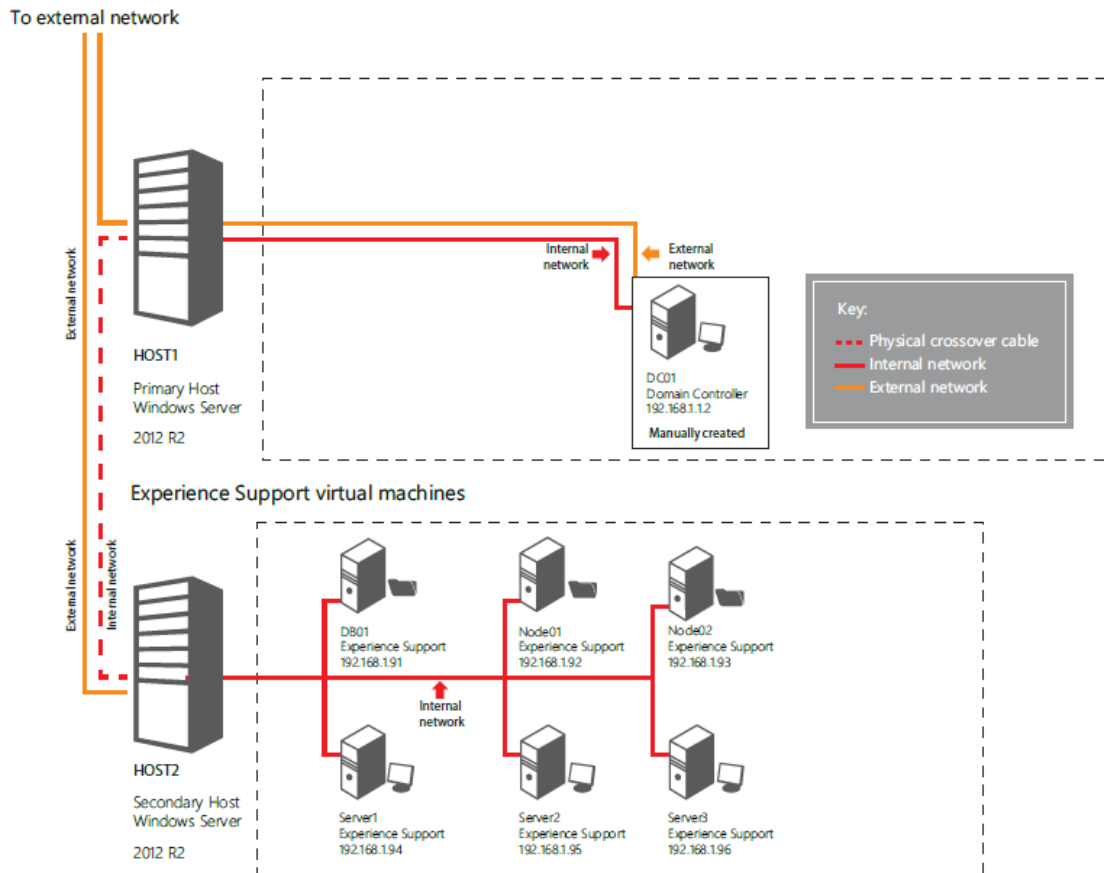


Figure 1: Evaluation environment for Windows Server 2012 R2

Prerequisites for the physical infrastructure

Hardware

- ✓ The datacenter evaluation environment requires **two host machines** with at least **two physical NICs** on each machine. The environment also requires hardware to support seven virtual servers.

Physical servers

The following minimum physical servers are recommended to run the datacenter evaluation environment, including the Windows Server experiences. Environments may differ, but this is the minimum necessary to perform the tasks with decent performance:

Name	CPU	Memory	Disk	NICs
HOST1	2 sockets with multiple cores per socket	48 GB	1TB divided into a 120GB C: drive with the remainder as D: drive	2 Physical NICs

Name	CPU	Memory	Disk	NICs
HOST2	2 sockets with multiple cores per socket	48 GB	1TB divided into a 120GB C: drive with the remainder as D: drive 3x 120GB or greater unallocated HDD (required for the Storage and Server Virtualization experiences)	2 Physical NICs

Some important notes regarding the servers:

- The primary network adapter settings will be determined based on the current external network environment.
- For the evaluation environment, the secondary network adapter uses a crossover cable to direct- connect the two hosts on a private network. The subnet mask is 255.255.255.0. As an alternative, you can also connect the secondary network adapters of both hosts to an isolated switch environment.

Note: This set up will require some reconfiguration when running some experiences.

- Both hosts should have static IPs.
- Reserve the IP ranges 192.168.1.0–192.168.1.99 for the isolated networking environment.
- The servers need D:\ drives where the VMCreator.ps1 script will build the virtual machines.

Software

You will be downloading evaluation versions of Windows Server 2012 R2 onto a test environment. The evaluation software is not for production use. Following the evaluation period, you will need to replace the operating system on your test computer and reinstall all your programs and data. It is not possible to upgrade the evaluation to a licensed working version; a clean installation is required.

Note: Hardware requirements include two hosts meeting the minimum specification as detailed in this section under [Hardware](#).

Operating System	
Windows Server 2012 R2	http://technet.microsoft.com/en-us/evalcenter/hh670538.aspx

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Transforming Your Datacenter

Windows Server Installation

This evaluation guide helps you explore some of the new capabilities of Windows Server 2012 R2. This section will describe the setup, configuration, and installation of the environment where you will be performing the evaluation experience tasks.

Reference Links	
Download Windows Server 2012 R2	Evaluation software
Installing Windows Server 2012 R2	Get information about installing the Windows Server operating system, including any known issues that you may need to work around before starting an installation. It also provides information that you can use to troubleshoot problems that may occur during the installation.
Install Active Directory Domain Services	Get instructions on installing Active Directory Domain Services (AD DS) through the new Server Manager Wizard on Windows Server 2012.

Introduction to the evaluation scripts

To help you create virtual machines to support the evaluation experiences in this guide, you can download evaluation scripts from the Microsoft website:

- [Datacenter Evaluation Deployment Tool](#)

You may use the evaluation scripts to build the six virtual machines required to support the experiences in this guide, or you may create and configure the virtual machines manually. Using the scripts can save hours of time and effort.

Note: The evaluation scripts build out the virtual machines to support the included Windows Server experiences. You can edit the ExperiencesVariable.xml file provided with the evaluation scripts to customize the configuration of the virtual machines.

As an example, all scripts designate "Contoso.com" as the default domain and "pass@word1" as the default password. To use another domain or password, edit the scripts and replace "Contoso.com" and / or "pass@word1" with the new domain name and password. In the following script files, initiate a Find and Replace to replace "Contoso.com" and "pass@word1" with the new domain and password.

- `\ActiveDir\InstallNewForest.ps1`

- \ActiveDir\AddAccts.ps1
- ExperiencesVariable.xml

Setting up the environment requires two main steps:

1. Follow the manual steps to prepare the hosts.
2. Configure the virtual machines using one of the following two approaches:
 - Deploy the evaluation virtual machines through manual configuration.
 - Run the evaluation script VMCreator.ps1 to create and configure the virtual machines.

This section walks you through the manual steps to prepare the physical hosts; the [Windows Server Deployment](#) section will cover configuring the virtual machines.

Installation of the datacenter evaluation environment

Complete the following tasks to properly prepare the host computers for the evaluation environment.

1. Set up host computers.
2. Create a virtual machine for the domain controller.
3. Configure the new domain controller.
4. Configure the two hosts.
5. Create VHDX Files.

TechNet articles are provided to assist in configuration processes.

Passwords

Important

All passwords in this evaluation guide are the same. For every account, use the password: "pass@word1."

Set up host computers

The evaluation environment requires two hosts running Windows Server to support multiple virtual machines. Setting up the host computers requires completing the following tasks:

- Install Windows Server 2012 R2.
- Add the Hyper-V role.
- Create a virtual switch.
- Configure the host network adapters.

Download and install Windows Server 2012 R2

Use these TechNet resources to install Windows Server on the two physical hosts.

- [Download Windows Server 2012 R2](#)
- [System Requirements and Installation Information for Windows Server 2012 R2](#)

Add Hyper-V roles

The Hyper-V role enables Hyper-V Manager, which is needed on both hosts to manage the virtual machines. It is important that each host has identical virtual network settings. The environment needs two virtual switches:

- Eval-External switch is a Hyper-V switch of type “external” that connects the two hosts to your public-facing IPs.
- Eval-Internal switch is a Hyper-V switch of type “internal” that connects the virtual machines to the Contoso domain through the internal isolated network or the domain you choose to use for the experiences.

To add the Hyper-V role to both host computers and create virtual switches, see this TechNet article:

- [Install the Hyper-V Role and Configure a Virtual Machine](#)

Note: Log onto each host and follow the directions in the article.

Create a virtual machine for the domain controller

You will first manually create the domain controller virtual machine on Host1, then run a script to configure the domain controller virtual machine. To create the virtual machine, follow the instructions in this TechNet Article: [Install the Hyper-V Role and Configure a Virtual Machine](#) (Step 2: Create a virtual machine).

1. Use the following data to manually create the domain controller on **Host1**:
 - a. Name: **DC01**.
 - b. Select the **Store the virtual machine in a different location** check box and set the location to **D:\VMs**.
 - c. For Specify Generation, select: **Generation 1**.
 - d. Set Startup memory at 1024MB and select **Use Dynamic Memory for this virtual machine** and set the maximum value to 2048.
 - e. Connection: the **Eval-Internal Virtual Switch** created when configuring the hosts.
 - f. Under Connect Virtual Hard Disk, click **Next**.

- g. Install Options: **Install an operating system from a boot CD/DVD-ROM** and select **Image File (.iso)**; then browse to **D:\ISOs** and select the ISO for **Windows Server 2012 R2**.
 - h. Start the virtual machine and **Install** Windows Server 2012 R2.
 - i. Once Windows is fully installed and running, open **System Properties** and rename the machine to **DC01**.
2. Set the DC01 IP address to **192.168.1.2**.

Note: The ExperiencesVariable.xml sets the IP address for the DNS server to 192.168.1.2.

3. If you haven't already, [click here](#) to download the evaluation scripts, which will be installed on your which will be installed on your C:/ drive unless you changed the directory. The Datacenter Evaluation Deployment Tool.msi file downloads the following scripts to the C:\temp\EvalScripts folder.
 - An **ActiveDir** folder with scripts to help you set up the domain controller.
 - **VMCreator.ps1** is a script to build virtual machine
 - **ExperiencesVariable.xml** contains settings used by the VMCreator.ps1 script to set up the virtual machines for the Windows Server experiences.
 - You will also see, but not use,
 - **SysCenterVariable.xml** file containing settings used to set up the virtual machines for System Center experiences. (This script works with the experiences in the [System Center 2012 R2 Evaluation Guide](#).)
 - **Downloader.ps1** file to download the prerequisites needed to configure System Center.
 - **Workflow.xml** containing settings for the downloader script.

Note: If you are using the scripts, be sure to transfer the scripts to the host before using, referencing the instructions in the following step.

4. Copy these scripts to the **DC01** virtual machine: Using File Explorer, browse from DC01 to Host1 and copy all of the scripts in **C:\temp\EvalScripts\ActiveDir** folder onto the DC01 virtual machine in the **C:\Temp\EvalScripts\ActiveDir** folder.
5. Open Windows PowerShell as **Administrator**, navigate to the directory and run scripts in the following order. If you have changed the domain, be sure to adjust the last two scripts.
 - `.\Add-ADPrereqs.ps1` – Note: This script will require a reboot when complete.
 - `.\Add-ADFeatures.ps1`
 - `.\InstallNewForest.ps1`– Note: This script will require a reboot when complete.
 - `.\AddAccts.ps1`

Group policies

Once you create the domain controller and use the scripts, set up Group Policies using these resources.

- [Group Policy Overview](#)
- [Group Policy – Configuration for Firewall Policies](#)

For this experience, create two Group Policy Objects (GPOs) at the domain level to enable and disable settings:

- Create a GPO to disable the Windows Firewalls on the server machines on the Domain Network.
- Create a GPO to enable remote desktop for easy access.

It is not necessary to disable Windows Firewall on all networks, just on the domain network. If you choose not to create these GPOs, then you will need to manually disable the firewall rules for the domain network and enable Remote Desktop on each machine.

Configure the two hosts

Connect the two hosts on Contoso domain or the domain you have chosen to use.

1. Either statically assign or reserve in DHCP the IP for NIC 01 of the hosts.
2. Subnet Mask for NIC 01 of the host is **TBD** based on user's environment.
3. Gateway for NIC 01 of the hosts is **TBD** based on user's environment.
4. Statically assign the IP NIC 02 of Host1 to **192.168.1.1**.
5. Statically assign the IP NIC 02 of Host2 to **192.168.1.60**.
6. Set the subnet mask of NIC 02 on both hosts to **255.255.255.0**.
7. Leave the gateway of NIC 02 for both hosts blank.
8. Set the DNS Server addresses for both hosts to the DC01 IP of **192.168.1.2** for both NIC 01 and NIC 02.
9. Once complete, join the hosts to the Contoso domain or the domain you are using, which will require a reboot of the host machines.

Set Remote Desktop properties

If necessary, set the Remote Desktop properties to allow users to remote to them. Share the **C:\Temp** and **D:** folders from Host1.

The Windows Server open platform allows partners to extend the functionality beyond what is in the platform.

Reference Links

[Configure RemoteApp and Desktop Connection Properties](#)

Create VHDX file

1. Download **Convert-WindowsImage.ps1**.

Note: The Convert-WindowsImage.ps1 file is available for download at <http://gallery.technet.microsoft.com/scriptcenter/Convert-WindowsImageps1-0fe23a8f>

2. Download the **ISO** files for [Windows Server 2012 R2](#).
3. Start **File Explorer** and create a **VHD** folder and **VM** folder on the **D:\ drive** on **Host1**.
4. Navigate to **C:\temp** folder and create a new directory with following name on Host1: **WindowsServer2012R2**.
5. Use **Convert-WindowsImage.ps1** to create the **WS2012R2.vhdx** file and place it in **\VHD folder** on **D:\ drive** of **Host1**:

Note: Follow the directions on the Convert-WindowsImages1 page to run this file on the host for the ISO. This creates the VHDX file in the D:\VHD folder.

6. Copy the **D:\VHD folder** on Host1 and paste on **D:\VHD folder of Host2**.

You are now ready to set up the virtual machines to help you explore the capabilities of Windows Server 2012.

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Windows Server Deployment

The process for building your datacenter infrastructure uses a combination of Hyper-V, failover clustering, storage, and networking technologies to more easily create a Microsoft cloud infrastructure. Windows Server 2012 R2 introduces a significant number of new features that provide all of the required capabilities for building an effective cloud infrastructure in an open platform. By taking advantage of automation, open-platform support, and a standards-based approach, a Windows Server-based cloud infrastructure decreases the total cost of ownership and reduces susceptibility to failures due to interoperability issues. The Windows Server open platform allows partners to extend the functionality beyond what is in the platform.

References

[Deploy Windows Server 2012](#)

Find information that helps you deploy Windows Server 2012, including:

[Server Core and Full Server Integration Overview](#)

[Configure and Manage Server Core Installations](#)

[Common Management Tasks and Navigation in Windows Server 2012](#)

Virtual servers for the Windows Server evaluation experiences

If you haven't already, [click here](#) to download the evaluation scripts, which will be installed on your desktop unless you changed the target directory.

Move the files to the **C:\temp** folder on **Host1**. You will be using these files to create and configure the virtual machines for the experiences. The scripts work with Windows 8.1 and Windows Server 2012 R2 operating systems.

Important

If you prefer to manually create the virtual machines and need instructions, see the [Windows Server Installation](#) section of this guide, specifically **Create a virtual machine for the domain controller**, and use the steps to create the virtual machines in **Figure 2**, modifying specifications as needed.

Before you run the VMCreator.ps1 script, update the **ExperiencesVariable.xml** file included with the scripts so that the **secondary host name** reflects the actual secondary host name. The following is a segment of the ExperiencesVariable.xml file, in which you can see how you might choose to adjust your domain credentials and target host.

```
<JoinDomain>
<Domain>contoso.com</Domain>
<Domain>contoso.com</Domain>
<Password>pass@word1</Password>
<Username>Administrator</Username>
</Credentials>
</JoinDomain>
<AdministratorPassword>pass@word1</AdministratorPassword>
</Default>
<VM Count="1">
<Host>Host2</Host>
<VMName>DB01</VMName>
<Memory>2048</Memory>
</VM>
<VM Count="2">
<Host>Host2</Host>
<VMName>Node01</VMName>
<Memory>2048</Memory>
</VM>
<VM Count="3">
<Host>Host2</Host>
<VMName>Node02</VMName>
<Memory>2048</Memory>
</VM>
```

```
<VM Count="4">
<Host>Host2</Host>
<VMName>Server1</VMName>
<Memory>2048</Memory>
</VM>
<VM Count="5">
<Host>Host2</Host>
<VMName>Server2</VMName>
<Memory>2048</Memory>
</VM>
<VM Count="6">
<Host>Host2</Host>
<VMName>Server3</VMName>
<Memory>
<Startup>8196</Startup>
<Minimum>8196</Minimum>
<Maximum>8196</Maximum>
<Buffer>20</Buffer>
</Memory>
</VM>
</VMs>
</Installer>
```

The VMCreator.ps1 script will create the virtual machines listed in **Figure 2**, which includes the minimum hardware requirements for each virtual server supporting the Windows Server 2012 R2 evaluation environment. The script sets

startup RAM for the virtual machines to 2GB (Server3 is the exception, with 8 GB). Memory is configurable through the ExperiencesVariable.xml to support dynamic RAM. Note: The IP addresses are set in the ExperiencesVariable.xml file and the VMCreator.ps1 script assigns each virtual machine a sequential IP address. When deploying the infrastructure and working through the different experiences, you may use your own IP addresses and better hardware. Modify the ExperiencesVariable.xml file to change the starting IP address.

If you are working with different IP ranges, take into account that for some of the experiences, you may need to change the ranges.

Name	Main IP	vCPU	Dynamic memory minimum	Disk
DB01	192.168.1.91	2	2 GB	60 GB
Node01	192.168.1.92	2	2 GB	60 GB
Node02	192.168.1.93	2	2 GB	60 GB
Server1	192.168.1.94	2	2 GB	60 GB
Server2	192.168.1.95	2	2 GB	60 GB
Server3	192.168.1.96	2	8 GB	60 GB

Figure 2: Windows Server virtual machine specifications

Deploy the Windows Server evaluation environment

Deployment involves executing an evaluation script you downloaded and moved to the **C:\Temp\EvalScripts** folder on Host1.

Open Windows PowerShell as Administrator, navigate to the following directory **C:\Temp\EvalScript** and run the **VMCreator.ps1** to create the virtual machines needed for the evaluation.

- `.\VMCreator -inputfile ExperiencesVariable.xml`

Run VMCreator.ps1

The VMCreator script works with the ExperiencesVariable.xml to perform four different tasks:

1. Creates all the virtual machines needed to evaluate Windows Server.
2. Installs the appropriate operating system on the virtual machines.
3. Sets virtual machine IP addresses.
4. Joins the virtual machines to the Contoso domain (or the domain you are using).

Virtual Machines					
Name ^	State	CPU Usage	Assigned Memory	Uptime	St
DB01	Running	0 %	2048 MB	02:49:22	
Node01	Running	0 %	2048 MB	02:47:50	
Node02	Running	0 %	2048 MB	02:48:05	
Server1	Running	0 %	2048 MB	02:47:24	
Server2	Running	0 %	2048 MB	02:47:00	
Server3	Running	0 %	8196 MB	02:46:18	

Figure 3: Windows Server Experience virtual machines

After the script runs successfully, you will see the newly created virtual machines listed in Hyper-V. **Figure 3** shows a screen shot of the virtual machines on Host2. The Domain Controller, DC01, is the only virtual machine on Host1.

At this point you will have the virtual machines set up for your evaluation environment and are ready to test some of the experiences found in the [Capability Scenarios](#) section.

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Capability Scenarios

With this guide you can discover new capabilities through a series of experiences based on the day-to-day activities at a fictitious company, Contoso. Like other organizations, Contoso's information technology (IT) team is turning to a cloud datacenter environment to support the needs of its internal customers. Among the team members at Contoso are Richard and Michael, who are datacenter admins, and Sarani, a service admin. In the next pages, you'll walk through a series of business challenges and resolutions.

The experiences require the virtual machines specified in the [Windows Server Deployment](#) section of this guide.

Windows Server Experiences

Storage

Experience: Build a storage infrastructure for your critical workloads

- Build an optimized file server using Storage Spaces and deduplication.
- Explore and configure highly available file servers.
- Create a Scale-Out File Server for SQL Server 2012.

Networking

Experience: Build a resilient network infrastructure

- Implement network teaming.
- Implement DHCP failover.

Server Virtualization

Experience: Build a virtualization infrastructure

- Create new virtual machines for use with live storage migration and Hyper-V Replica.
- Perform a live storage migration to Scale-Out File Server highly available share.
- Perform an online VHDX resize.
- Implement Hyper-V Replica.

Server Management and Automation

Experience: Use Server Manager and Windows PowerShell 4.0 to manage Windows Server

- Use Server Manager to manage multiple servers.
- Use Windows PowerShell to perform server management.
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- Protect data.

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Storage

Get enterprise-class features on industry standard hardware



Roles:

Infrastructure admin



Technologies:

Windows Server 2012 R2

🔍
Features enabled in this capability

- Storage Spaces
- Storage tiering
- Data deduplication
- Scale-Out File Server

The demand for storage continues to grow each year. Organizations are challenged to keep up with the demand while remaining within budget and are increasingly turning to enterprise-class storage class solutions that run on industry-standard hardware.

<p>High performance and resiliency at a fraction of the cost</p>	IT demands		
	Less expensive, enterprise-class storage solution	Guaranteed high levels of Service Level Agreement (SLA)	Efficient management of storage resources
	Windows Server 2012 R2 delivers		
<p>High-performance storage on industry-standard hardware.</p> <ul style="list-style-type: none"> • Storage spaces for inbox storage virtualization with automatic tiering • RDMA hardware offloading significantly improving scale for SMB traffic 	<p>Continuous application availability and robust recovery.</p> <ul style="list-style-type: none"> • SMB transparent failover for < 25ms failover time • Fine-grained, per-share SMB scale-out • Windows Azure Hyper-V Recovery Manager 	<p>Comprehensive storage management and backup.</p> <ul style="list-style-type: none"> • Online VHDX resize • Storage QoS • Unified storage management • Windows Azure Backup 	

The Contoso infrastructure administrator, Richard, needs a storage solution that's both fast and resilient. He has been tasked with increasing the company's storage capacity in order to accommodate growth and potential acquisitions. He also needs to create a storage infrastructure that will allow for continuous availability of virtual machines and can store critical apps, even during mobility scenarios.

Contoso has a significant investment in local storage, both iSCSI and Just a Bunch of Disks (JBOD), and has not allocated a budget for more.

The company's current storage hardware consists of multiple SAS and SATA drives acquired over the years. These drives were manufactured by different vendors and have different capacities and performance specifications. This hardware is physically located in different computer rooms and offices throughout the company. Some drives are collocated with the departments that use them, while others are remote.

Richard needs to:

- Implement storage tiering in order to optimize use of current storage and improve storage performance.
- Separate storage and compute elements of virtual machines, gaining the ability to move virtual machines without moving the storage.
- Avoid disruptions in application and data availability.
- Keep the administration of the increased storage infrastructure as simple and inexpensive as possible.

By using Windows Server 2012 R2, Richard is able to maintain application and data availability on the company's current storage infrastructure without increasing costs. The storage tiering capability of Windows Server automatically identifies hot data—the data that changes most often on the disk—and moves it to Tier 1 (SSD) storage while keeping cold data on Tier 2 (SAS) storage. Constantly monitoring data usage, Windows Server moves any hot data that turns cold to slower storage, and vice versa, with no administrator intervention needed. As a result, Richard finds it easier to access storage than in the past.

Storage Spaces gives Contoso the ability to consolidate its SAS and SATA disks—whether they are SSDs or traditional HDDs—and consolidate them as storage pools. Once Richard has created these pools, he can create logical disks from them, called Storage Space virtual disks, which Windows applications recognize as standard drives. Next, he can assign storage pools to different departments within Contoso to keep data isolated and administration easy. Storage Spaces enables Richard to increase storage utilization for Contoso without having to buy more storage devices, and it provides secure, reliable data backup.

The following experience shows you how to build a storage infrastructure for critical workloads.

Experience: Build a storage infrastructure for your critical workloads

Windows Server 2012 R2 introduces the ability to leverage SMB-based storage for server applications such as SQL Server and Hyper-V. In this experience, you will explore and implement a storage local area network (LAN). A storage LAN consists of a Windows Server file server cluster

which is configured for continuous availability, with transparent failover, and SMB Multichannel on a dedicated IP subnet. Here are the tasks you will undertake:

- Build an optimized file server using Storage Spaces and deduplication.
- Explore and configure highly available file servers.
- Create a Scale-Out File Server for SQL Server 2012.

Prerequisites

This experience requires additional software setup and hardware may require augmentation.

- You will need two additional virtual network adapters for DB01.
- You will need to [download and install SQL Server 2012 SP1](#).

Reference Links

For additional guidance, see the following TechNet article:

[Installing the Failover Cluster Feature and Tools in Windows Server 2012](#)

[Creating a Windows Server 2012 Failover Cluster](#)

[Part 6. Setting up a Windows Server 2012 Cluster and Placing Virtual Machines into a Hyper-V Cluster on Windows Server 2012](#)

- ✓ Before beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint**. This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Build an optimized file server using Storage Spaces and deduplication

In this experience, you will walk through the creation of a new storage-optimized file server using Storage Spaces and deduplication. Such tasks enable Richard to provide a robust and resilient storage infrastructure using industry-standard storage. Deduplication will enable Richard to compress the actual storage used to the unique sectors on disk.

Create a Storage Space


In this task, you will create a Storage Space from four disks attached to the server computer. In this experience you will be doing this with four additional virtual disks attached to a virtual machine, in production you would do this using a JBOD disk array that is attached to a server computer.

A Storage Space will allow you to take physical disks attached to a server and create a pool of storage that you can then allocate to create virtual disks that support different types of parity for resiliency, and flexibility.

To prepare for this task, you will need to create four unallocated VHDX disks and attach them to the Node01 virtual machine under the virtual SCSI Controller Hardware as detailed in the following steps.

1. Log into Host2 and bring up **Hyper-V Manager**.
2. Right-click on **Node01** virtual machine and select **Settings**. If Node01 is running, shut down the virtual machine prior to proceeding.
3. In settings, select **SCSI Controller** and **Select Hard Drive**, and click **Add**.
4. Under the Virtual hard disk selection click **New**.
5. On the Before you Begin page, click **Next**.
6. On the Choose Disk Format page, select **VHDX** and click **Next**.
7. On the Choose Disk Type page, select **Dynamically Expanding**, and click **Next**.
8. On the Specify Name and Location page, for Name enter **Node01_Disk1** and for location enter **D:\VMs\Node01\Virtual Hard Disks**.
9. On the Configure Disk page, use the pre-defined defaults, and click **Next**.
10. On the Completing the New Virtual Hard Disk Wizard page, click **Finish**.
11. Repeat steps 3-10 till you have four SCSI VHDX disks attached to the server, naming them **Node01_Disk(disk number)**.
12. Once you have attached all four SCSI VHDX start the virtual machine.
13. Repeat steps 1-12 for Node02. Naming the disks **Node02_Disk(disk number)**.

Create a resilient pool of disks

 Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open Server Manager.
2. Select **Manage** from the top menu and select **Add Roles and Features**.
3. On the Before you Begin page, click **Next**.
4. On the Select installation type page, select **Role-based or feature-based installation** and click **Next**.
5. On the Select destination server page, Select **Node01** from the Server pool and click **Next**.
6. On the Select server roles page, select the **File and Storage Services** role and check the **File and iSCSI Services** role. Once you have selected the role, expand it, and manually select the **Data deduplication** sub-feature and click **Next**.
7. On the Features page, click **Next**.
8. On the Confirm installation selections page, click **Install**.
9. Once the Role has been installed, click **Close**.
10. In the left navigation of Server Manager, click **File and Storage Services**, and then click **Storage Pools**.

Note: Server discovery must complete before this area is populated with data. This may take a few minutes.


11. Under Storage Spaces, click **Primordial**.
12. Right-click Primordial, and then select **New Storage Pool**.
13. On the Before you Begin page, click **Next**.
14. On the Storage Pool Name page, in Name, type **DAS-Pool**, then select the Primordial disk for Node01 and then click **Next**.
15. On the Physical Disks page, check the check boxes for PhysicalDisk1, PhysicalDisk2, PhysicalDisk3, and PhysicalDisk4, and then click **Next**.
16. Click **Create**, and then click **Close**.

Richard has now used Storage Spaces to create a resilient pool of disks that he can leverage for his virtual machines, SQL Servers, and file storage. These resources can now be shared by multiple users or applications through SMB 3.

Create a deduplicated volume

Create a deduplicated NTFS volume

Richard wants to ensure that he is only using disk space for unique sectors of disk. With the deduplication capability of Windows Server 2012, Richard can take data stored on disk and shrink the space used to only unique sectors. This can save space for files at rest. Richard can also use deduplication for VDI environments as well.

 Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In Server Manager, right-click **DAS-Pool**.
2. Click **New Virtual Disk**.
3. On the Before you Begin page, click **Next**.
4. On the Storage Pool page, click **DAS-Pool**, and then click **Next**.
5. On the Virtual Disk Name page, in Name, type **User-File-Storage**, and then click **Next**.
6. On the Storage layout page, click **Mirror**, and then click **Next**.
7. On the Provisioning page, click **Thin**, and then click **Next**.
8. On the Size page, in Virtual disk size, type the size in GB you wish to make the Virtual Disk, and then click **Next**.
9. Click **Create**, and then click **Close**.
10. On the Before you Begin page, click **Next**.
11. On the Select the server and disk page, click **Next**.
12. On the Specify the size of the volume page, click **Next**.
13. On the Assign to a drive Letter or folder page, click **Next**.

14. On the Select file system settings page, in File System, select **NTFS**, and then click **Next**.
15. On the Enable data deduplication page, from the drop down menu, select **Virtual Desktop Infrastructure (VDI) server**.
16. In the Deduplicate files older than (in days) box, type **0**, and then click **OK**.

Create a new user file share

Use Server Manager to create a new file share to hold user files on the newly-created deduplicated Storage Space.

- ✓ Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
 1. In Server Manager, click **Shares**.
 2. Click **Tasks**, and then click **New Share**.
 3. On the Select the profile for this share page, select **SMB Share – Quick** and click **Next**.
 4. On the Select the server and path for this share page, click **Node01**, and then in Select by volume, click **D:** and then click **Next**.
 5. On the Specify the share name page, in Share name, type **User-Docs**, and then click **Next**.
 6. Click **Next** on all remaining screens, using the pre-defined defaults and then click **Create**.
 7. Click **Close**.
 8. Using Windows Explorer, navigate to **\\Node01\User-Docs**.

Test and validate deduplication

Place a large number of duplicate files on this new share, and ensure the files consume the minimum required space by implementing deduplication and forcing a deduplication job.

- ✓ Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
 1. In Windows Explorer, browse to **\\Node01\User-Share** and create a folder named **User1**.
 2. In Windows Explorer, browse to **\\Node01\User-Share** and create a folder named **User2**.
 3. On the taskbar, click **Windows PowerShell**.
 4. Type the following commands, pressing ENTER after each one.
 - ↳ Copy c:\Windows\System32\drivers \\Node01\user-docs\user1 - Recurse
 - ↳ Copy c:\Windows\System32\drivers \\Node01\user-docs\user2 - Recurse
 5. Type the following commands, pressing ENTER after each one.
 - ↳ Enter-PSSession Node01
 - ↳ Get-Command *Dedup*
 - ↳ Get-DedupStatus
 - ↳ Start-Dedupjob -Volume D: -Type Optimization

```
↪ Get-DedupJob
↪ Get-DedupStatus
```

Note: The deduplication has saved 63 MB of space.

```
↪ Exit-PSSession
```

With deduplication in Windows Server 2012, Richard has found a way to shrink storage utilization and efficiently store data for his end users.

- ✓ Delete your Storage Pool and remove your four attached SCSI drives from Node01 before moving on the next task.

Explore and configure highly available file servers

In this task, explore the configuration of a highly available file server configured to provide services such as SMB Multichannel and SMB transparent failover, a feature that Richard can use to keep databases and virtual machines available and online in case of network and server issues. Richard will also use a new feature of Windows Server 2012 R2 to create shared VHDX files to support a guest operating system cluster allowing Richard to truly separate the physical infrastructure from his virtual infrastructure.

Prerequisites

This task requires additional hardware:

- On Host2, a minimum of three physical drives (which was detailed in the table describing hardware recommended for the experiences), each with at least 120 gigabytes (GB) capacity, are required to create a storage pool to represent a failover cluster using the following steps.

Prepare infrastructure for failover cluster

Windows Server 2012 R2 introduces a new way to present shared storage to a Hyper-V guest for failover clustering. This new method uses shared VHDX files as shared storage for the guest cluster. For production environments, shared VHDX files can only be stored on a physical cluster's Cluster Shared Volume (CSV), or an exposed SMB share from a Scale-Out File Server due to redundancy issues as described in this TechNet article, [Virtual Hard Disk Sharing Overview](#).

Next, you will walk through the steps to configure a demo of shared VHDX using a physical computer with three virtual machines: First, review the names, roles, and IP addresses for the computers required:

Name	Main IP	vCPU	Memory	Disk
DB01	192.168.1.91	2	2 GB	60 GB
Node01	192.168.1.92	2	2 GB	60 GB
Node02	192.168.1.93	2	2 GB	60 GB
Server1	192.168.1.94	2	2 GB	60 GB
Server2	192.168.1.95	2	2 GB	60 GB
Server3	192.168.1.96	2	8 GB	60 GB

Important

For production environments, shared VHDX requires a physical cluster shared storage provided through either a CSV, or Scale-Out File Server SMB Share. For demonstration purposes, the shared storage capability on a single host is emulated as a substitute for a CSV or Scale-Out File Server SMB Share.

Install required roles and features on Host2

To support shared VHDX, install the clustering feature on Host2 to ensure the proper drivers are on the system.

- ✓ Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
 1. Install the Failover Cluster Feature and Tools on Host2 by referencing this TechNet article: [Installing the Failover Cluster Feature and Tools in Windows Server 2012.](#)
 2. Repeat step 1 for Node01 and Node02.

Create volume E: using the unallocated HDDs

Pool the three unallocated disks that are physically attached to Host2 and create a Storage Space, which you can then use to create the E:\ drive to store the shared VHDX files.

- ✓ Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

Create a storage pool using unallocated HDDs

1. In the left navigation of Server Manager, click **File and Storage Services**, and then click **Storage Pools**.

Note: Server discovery must complete before this area is populated with data. This may take a few minutes.

2. Under Storage Spaces, click **Primordial**.

3. Right-click Primordial and select **New Storage Pool**.
4. On the Before you Begin page, click **Next**.
5. On the Storage Pool Name page, in Name, type **HostClusterPool**, then select **Primordial disk** for Host2 and click **Next**.
6. On the Physical Disks page, check the check boxes for PhysicalDisk1, PhysicalDisk2, and PhysicalDisk3, and then click **Next**.
7. Click **Create** and click **Close**.

Create a virtual disk on the storage pool

1. In the left navigation of Server Manager, click **File and Storage Services**, and then click **Storage Pools**.
2. Under Storage Spaces, click **HostClusterPool**.
3. Right-click HostClusterPool, and then select **New Virtual Disk**.
4. On the Before you Begin page, click **Next**.
5. Select **HostClusterPool** from the available Storage Pools and click **Next**.
6. On the Specify the virtual disk name page, name the disk **HostClusterVD** and click **Next**.
7. On the Select the storage layout page, select **Mirror** and click **Next**.
8. On the Specify the provisioning type page, select **Fixed** and click **Next**.
9. On the Specify the size of the virtual disk page, select **Maximum size** and click **Next**.
10. On the Confirm selections page, click **Create**, and then click **Close**.

Create a volume on the virtual disk

1. In the left navigation of Server Manager, click **File and Storage Services**, and then click **Storage Pools**.

Note: Server discovery must complete before this area is populated with data. This may take a few minutes.

2. Under Virtual Disks, click **HostClusterVD**.
3. Right-click **HostClusterVD**, and select **New Volume**.
4. On the Before you Begin page, click **Next**.
5. On the Select the server and disk page, select **HostClusterVD** on **Host2** from the available Servers and Disks and click **Next**.
6. On the Specify the size of the volume page, use the default values populated (maximum size) and click **Next**.
7. On the Assign to a drive letter or folder page, select **Drive Letter** and select **E** from the drop- down menu and click **Next**.
8. On the Select file system settings page, select NTFS for the file system and Default for the allocation Unit size, name the volume **HostClusterVolume** and click **Next**.

9. On the Enable Data Deduplication page, select **Virtual Desktop Infrastructure (VDI) server** and leave the other fields at the default values, and click **Next**.
10. On the Confirm selections page, click **Create**, and then click **Close**.

Create shared VHDX files for the Scale-Out File Server cluster

Before you can create and attach the shared VHDX files, load the filter driver to allow the experience environment to support the shared VHDX.

Important

In this storage experience, you will implement Shared VHDX, a new Windows Server 2012 R2 Hyper-V storage feature that allows you to simulate a shared SCSI bus for SAN storage. Shared VHDX should only be used in a production environment with high-performance, external JBOD SAS storage. In this experience, the SAS storage is simulated by local storage due to resource constraints in the evaluation environment.

Manually load the filter driver for volume E:\

1. On the taskbar, right-click **Windows PowerShell** and run as administrator.
2. Type the following command, pressing **ENTER** at the end of the line

```
↩ fltMC.exe attach svhdxflt E:\
```

Note: Manual attach is not supported (test only) and is not saved across reboot. You will have to re-issue the command after each reboot.

✓ Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager**.
2. Select **New->Hard Disk** from the Action pane on the right-hand side .
3. On the Before you Begin page, **click Next**.
4. On the Choose Disk Format page, select **VHDX** and click **Next**.
5. On the Choose Disk Type page, select Dynamically Expanding, and click **Next**.
6. On the Specify Name and Location page, for Name enter HCSV_Disk1 and for location enter **E:\VHDs**.
7. On the Configure Disk page, set the size to 40GB, and click **Next**.
8. On the Completing the New Virtual Hard Disk Wizard page, click **Finish**.
9. Repeat steps 2-10 until you have seven SCSI VHDX created, naming them **HCSV_Disk(disk number)**

Add the seven data VHDX files to each of the two virtual machines, with sharing option enabled.

1. Log into **Host2** and bring up **Hyper-V Manager**.
2. Right-click on **Node01** virtual machine (if Node01 is running, shut down the virtual machine prior to proceeding) and select **Settings**.
3. In settings, select **SCSI Controller** and **Select Hard Drive**, and click **Add**.
4. Under the Virtual hard disk selection click **Browse**.
5. Browse to E:\VHDs\ and select **HCSV_Disk1** and click **Open**.
6. Under **SCSI Controller** for the hardware for Node01 settings, expand the **Advanced Features** for **HCSV_Disk1** and select the **Enable Virtual Hard Disk Sharing** check box.
7. Click **Apply**.
8. Repeat steps 3-6 for all seven VHDX disks for **Node01**.
9. Start **Node02** logged in as **Contoso\Administrator**.
10. Open the **Disk Manager** by using the **Windows Key + X** and selecting **Disk Management**.
11. Right-click on each of the unallocated HDDs you see in the Disk Manager and bring them **Online** and **Initialize** them.
12. Repeat for all of the unallocated drives.
13. Repeat steps 2-12 for all VHDX disks on **Node02**

Configure the Scale-Out File Server cluster

Now, with the shared VHDX files attached to Node01 and Node02, Richard can create the Scale-Out File Server cluster which will provide the storage for his SQL Server in a resilient and highly available manner.

Validate cluster

- ✓ Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. On the taskbar, right click Windows PowerShell and run as administrator.
2. Type the following command, pressing ENTER at the end of the line.

```
↪ Test-Cluster -Node Node01, Node02
```

Create cluster

- ✓ Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. On the taskbar, right click **Windows PowerShell** and run as administrator.
2. Type the following command, pressing **ENTER** at the end of the line.

```
↪ New-Cluster -Name VirtualCluster -Node Node01, Node02
- StaticAddress 192.168.1.31
```

Add storage pool to cluster shared volumes


- ✓ Begin this step logged on to **Node01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Failover Cluster Manager** and expand **Storage**.
2. Under **Storage**, select **Pools**, and select **New Storage Pool** from the Action Pane.
3. On the **Before you Begin** page, click **Next**.
4. On the **Specify a storage pool name and subsystem** page, and type **VirtualPool** for the name of the Pool and click **Next**.
5. On the **Select physical disks for storage pool** page, select all of the **Physical Disks** and click **Next**.
6. On the **Confirm selections** page, click **Create** and then **Close**.

Create a Scale-out File Server for SQL Server 2012

In this experience, you will create a new virtual disk in the ClusterStoragePool that will be used as the back end storage for a Scale-out File Server. The Scale-out File Server will host this virtual disk as the back end of a continuous availability share, which you will use to store SQL Server 2012 user database files. The continuous availability share can be moved from one node to another without going offline, which makes it ideal for SQL Server 2012 database files which have to stay online during any mobility scenario of the virtual machine.

Create a new virtual disk for use in this experience

 Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager** and connect to **Node01**.
2. On **Node01**, open **Server Manager**.
3. Expand **File and Storage Services**, and verify you have a Storage Pool named **VirtualPool**.
4. Select **VirtualPool**, right-click on the **Virtual Disks** pane, and select **New Virtual Disk**.
5. Click **Next**.
6. Click **Next**.
7. Name the new virtual disk **DB01_CSV** and click **Next**.
8. Click **Next** to accept **Simple resiliency**.
9. Set the size to 15 GB and click **Next**.
10. Click **Create**, then click **Close**.

Initialize and format the DB01_Store disk

1. The **New Volume Wizard** should automatically start.
2. Click **Next**.
3. Select the virtual disk **DB01_CSV** and click **Next**.
4. Click **Next** on **Size** page, accepting predefined values.
5. Select **Do Not Assign a Drive Letter** and click **Next**.
6. For the Volume Label, type **DB01_CSV** and click **Next**.

7. On Data Deduplication page ,click **Next**.
8. When the format is done, click **Close**.

Create a new Scale-Out File Server

1. Start logged onto **Node01** as Contoso\Administrator.
2. Open Server Manager, if it's not already open.
3. From the **Tools** menu, select **Failover Cluster Manager**.
4. From **Failover Cluster Manager**, expand **Storage**→**Disks**.
5. You should see **DB01_CSV** as available storage.
6. Right-click on **DB01_CSV** and select **Add to Cluster Shared Volumes**.
7. The disk should now indicate it's assigned to **Cluster Shared Volumes**.
8. Right-click on **Roles** and select **Configure Role**.
9. Click **Next**.
10. Select **File Server** and click **Next**.
11. Select **Scale-Out File Server** for **Application Data** and click **Next**.
12. Name it **SOFS-SQL** and click **Next**.
13. Click **Next** on confirmation page
14. Click **Finish**
15. Stay logged onto Node01 for the next task.

Note: You should now see SOFS-SQL in the roles. It may take a minute or two for provisioning and propagation to Node02. Wait for the role to come online.

Note: Verify that the cluster object (VirtualCluster) has “create computer” rights in the OU in which the cluster nodes and objects reside.

Create a new Scale-Out File Server Share

1. Start logged onto **Node01** as Contoso\Administrator with **Failover Cluster Manager** open.
2. Right-click on **SOFS-SQL** and select **New File Share**.
3. For the type, select **SMB Share Applications** and click **Next**.
4. For the Server, select **SOFS-SQL** and for the volume, select the **15GB CSV partition** you just created and click **Next**.
5. Name the share **SQLData** and click Next
6. Click **Next** on **Configure Share Setting** (**Continuous Availability** should already be selected).
7. Click **Customize Permissions**.
8. Click **Add** and then click **Select a Principal**.
9. Click **Object Types**.
10. Check the **Computers** check box, then click **OK**.
11. Type **DB01** and then click OK.
12. If Multiple Names found, click **DB01**, and then click **OK**.

13. Check the **Full Control** check box, and then click **OK**.
14. Click **OK** to save **ACL settings**.
15. Click **Next**.
16. Click **Create**, then click **Close**.

Configure SQL Server to use the Scale-Out File Server share for user database files

✓ Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager** and connect to **DB01**.
2. Logon to **DB01** as **Contoso\Administrator**.
3. Run **\\SOFS-SQL**.
4. You should see the **SQLData share**.
5. Open **SQL Server Management Studio** (from the SQL Server 2012 tile group).
6. Attach to the database engine using your current credentials (Contoso\administrator).
7. Expand **Databases**.
8. Right-click on **Databases** and select **New Database**.
 - a. For the database name use: **CA-Test**.
 - b. For the data file path use **\\SOFS-SQL\SQLDATA**.
 - c. Click **OK** to create the database.
9. Run **\\SOFS-SQL\SQLDATA** and you should see the CA-Test database file.
10. Click **New Query**.
11. Type or paste in the following script and run it to create a table with a few rows of data

```
Use [CA-Test]
```

```
Go
```

```
Create Table tbl_CAtest (First Name varchar (10),
  LastName varchar (10))
```

```
On [primary]
```

```
Go
```

```
Insert tbl_CAtest (FirstName, LastName) Values
('John', 'Doe')
```

```
Insert tbl_CAtest (ID, FirstName, LastName) Values
('Mary', 'Jane')
```

```
Insert tbl_CAtest (ID, FirstName, LastName) Values
('Mike', 'Smith')
```

12. Press **F5** to run the statement.
13. Type in the following command to run a query that returns data from the CA-Test DB.

```
Select * from tbl_CAtest
```

14. Press **F5** to run the query. If you hold the F5 key down it will continually run.
15. Keep your query window up and switch to **Node01, Failover Cluster Manager**.
16. Right-click on the **SOFS-SQL** role and select **Move** and move the SOFS-SQL role to **Node02**.
17. Go back to **DB01** and verify that you can still query the data file.



Continue on to the [Networking](#) experience, which builds on your work in the [Storage](#) section above. First, **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

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Networking

Build a resilient network infrastructure



Roles:

Infrastructure admin



Technologies:

Windows Server 2012 R2

System Center 2012 R2

Virtual Machine Manager

Windows Azure



Features enabled in this capability


- Network virtualization.
- NIC teaming.
- Advanced software-defined networking.
- Load balancing and failover (LBFO).

Networking is a crucial component of nearly all computing environments. The IT professional faces increasing network demands driven by the exponential growth of data worldwide, and private and public cloud implementations that reflect the expanding appetite of users for streaming video, social media, virtual reality and games, or line of business applications and databases. Networks today must support multiple tenants with conflicting IP addresses and offer continuous availability.

Contoso's IT department faces networking challenges based on growing pains. Its IT infrastructure administrator, Richard, needs to merge the network of a newly-acquired company into the Contoso network.

The acquisition company is located in another city, its network equipment is based on old networking protocols, and its servers run on Linux rather than the Windows servers that Contoso uses. The acquisition's data protection system does not meet Contoso's requirements, lacking both failover protection and backup capability. Employees back up their data themselves manually onto thumb drives. Also, the acquisition has a custom data application that runs on a company server, but this application needs to access Contoso data maintained on servers at multiple Contoso facilities.

On the positive side, the new company's network has more capacity than it needs. Richard wants to take advantage of this and allocate the excess for use by the Contoso network.

Hybrid networking with breakthrough levels of flexibility and performance 	IT demands		
	Simplified use of network resources in a multi-tenant, cross-premises environment	Continuously available and resilient network infrastructure	Greater control and more extensibility
Windows Server 2012 R2 delivers			
Software-defined network infrastructure. <ul style="list-style-type: none">• Hyper-V Network Virtualization and multi-tenant site-to-site VPN gateway in-box• Standards-based switch configuration	High-performance networking. <ul style="list-style-type: none">• Single root I/O virtualization with support for live migration and HA• NIC teaming with increased load-balancing performance	Improved manageability and diagnostics. <ul style="list-style-type: none">• Resource metering• Virtual IP address management• QoS management• DNS traffic management	

With Microsoft Windows Server 2012 R2, Richard is able to merge the networks. The solution helps him address networking challenges using a number of Windows Server features and components:

- **Windows Server** reduces the complexity of network infrastructure and simplifies migration across clouds with full IP portability.
- **NIC teaming** provides fault tolerance by enabling multiple network interfaces to work together as a team, preventing connectivity loss if one network adapter fails. NIC teaming also enables bandwidth aggregation, enabling IT to combine bandwidth from multiple network adapters, a feature Richard uses to improve throughput. Richard can also take advantage of the in-box NICs on his servers now to provide switch-independent load balancing and failover.
- **IP address management (IPAM)** enables Richard to centrally manage IP addresses, domain names and device identities across Contoso and its virtualized networks, preventing conflict and resulting DNS issues.
- **Advanced software-defined networking** gives control over the network to an application so that applications can request network resources.
- **Hyper-V Network Virtualization** integrates the two networks and enables the acquisition network to use the Contoso failover and backup systems for protection, making the custom application resilient to underlying hardware failure and maintaining high service level agreements (SLAs).

Richard executes additional tasks with System Center 2012 R2 Virtual Machine Manager (VMM) and Windows Azure. (Learn more about these technologies in the [System Center 2012 R2 Evaluation Guide](#).)

- **Windows Azure** provides reliable, transparent cross-premise connectivity for networking, allowing the Contoso and acquisition networks to share data and storage.
- **System Center VMM** manages the combined network, allowing Richard to give Contoso employees access to the acquisition's custom application.

Windows Server enables Richard to merge the acquisition network with Contoso's, make applications available across the combined network, and manage the combined network.

Take a look at one experience that can help you learn to build a resilient network infrastructure.

Experience: Build a resilient network infrastructure

In this experience, Richard will use technologies to create a more resilient network infrastructure.

- Implement network teaming
- Implement DHCP failover

Prerequisites

This experience builds on the steps in the [Storage](#) experience. Complete that section first.

- ✓ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint**. This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Implementing network teaming

Richard sets up network teaming to ensure his Hyper-V host servers remain online in the event of a physical network fault or cable fault. The feature enables multiple network interfaces to work together as a team, preventing connectivity loss. Windows Server 2012 includes a native network teaming provider which can team adapters of any type from any vendor without need for vendor-specific software or configuration.

- ✓ Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
 1. Open **Hyper-V Manager**.
 2. Right-click on **Server1**, and select **Settings**. If the virtual machine is running shut it down before proceeding.
 3. From the **Settings** menu, select **Add Hardware**. From the list of available hardware to add to your virtual machine, select **Network Adapter** and click **Add**.
 4. In the **Network Adapter** settings dialog for your new adapter, select **Eval-External for your Virtual Switch** and click **OK**.
 5. Start the virtual machine.
 6. Repeat steps 2-6 for Server2.

Create a new network team with Server Manager

In this step, you will create a network team on Server1 using the user interface.

- ✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Server Manager**.
2. In **Server Manager**, click **All Servers**.
3. Right-click **Server1**, and then click **Configure NIC Teaming**.
4. In Adapters and Interfaces, highlight the two connected network adapters.

Note: The network adapters may be labeled differently depending on your hardware. Names such as Local Area Connection or Ethernet are common.

5. Click **Tasks**, and then click **Add to New Team**.
6. In Team Name, type **NIC-TEAM**, and then click OK.

Note: Creating the NIC team will take about 30 seconds. This uses a remote session, with a delay while the new IP address and DNS entries are completed before the status updates. When performed locally, this takes seconds.

Create a new network team with Windows PowerShell

In this step, you will create a network team on Server2 using Windows PowerShell.

- ✓ Begin this step logged on to **Server2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Windows PowerShell** as Administrator.
2. Type the following command, and then press **ENTER**. Press **A** when prompted.
↪ `New-NetLBFOTeam -Name NIC-TEAM -TeamMembers (Get-NetAdapter |where status -eq 'up').Name`

Note: The command may return a status of DOWN initially, but the fact that the status was returned means it is actually UP. If you get an error, make sure that you type the command exactly as written; for example, there are no spaces in the string at the end of the command: `".Name"`

3. Type the following command, and then press **ENTER**.
↪ `Get-NetLBFOTeam`

Note: Observe the status and members.

4. Close the Windows PowerShell command prompt.

Implement DHCP failover

Richard takes advantage of the in-box NICs on his servers to provide switch-independent load balancing and failover. In this experience, you will add the DHCP Server role on Server1 and Server2 and configure them as failover partners in hot-standby mode. You will use Server3 as the DHCP client and demonstrate the replication and failover capabilities of DHCP Server in Windows Server 2012.

Richard uses DHCP failover to ensure clients will be able to access network resources even if the main DHCP server goes down.

Add the DHCP Server roles to both servers and authorize the servers for Contoso.com

- ✓ Begin this step logged on to **Host2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
 1. Open Hyper-V Manager.
 2. Double-click **Server1** to connect to it.
- ✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
 3. Open **Server Manager** on **Server1**.
 4. Right-click on **All Servers** and select **Add Servers**.
 5. Click the **Active Directory** tab.
 6. Click the **Find now** button.
 7. Select **Server2** from the list, click the right arrow button to add to the managed server pool, and click **OK**.
 8. Select **Server1** from the managed servers list.
 9. From the **Tools** menu, select **Add roles and features**.
 10. Click **Next**.
 11. Click **Next**.
 12. Select **Server1** from the list and click **Next** to get to the server role selection screen.
 13. In the **Select server roles** dialog, select **DHCP Server**, click **Add features when prompted**, and then click **Next**.
 14. In the Select features dialog, click **Next**.
 15. On the DHCP Server screen, click **Next**, then click **Install**.
 16. Allow the installation to complete, and then in the Results window, click the link for **Complete DHCP configuration**.
 17. In the **DHCP Post-Install Configuration Wizard**, click **Next**, then click **Commit**.
 18. On the **Summary** page, click **Close**.
 19. In the **Add Roles and Features Wizard**, click **Close**.
 20. Repeat steps 10-18 for **Server2**. (This time, choose **Server2**.)

Create a DHCP address scope

Perform the following steps on Server1.

1. From Server Manager, select **Tools→DHCP**.
2. Right-click on **IPv4** and select **New Scope**.
3. Click **Next**.
4. Name the Scope **EvalScope**.
5. For the range, use the following:
 - a. Start IP address: **192.168.1.115**
 - b. End IP address: **192.168.1.125**
 - c. Subnet mask: 24 bits (255.255.255.0)
6. Click **Next**.
7. Click **Next** to proceed with no address exclusions.
8. Click **Next** to accept the default lease duration value.
9. To configure options, click **Next**.
10. Set the Default Gateway to 192.168.1.1.
11. Set the DNS Servers to DC01 and click **Resolve**. This should set the DNS Server to 192.168.1.12.
12. Click **Next** in WINS Server.
13. Leave **Yes** selected and click **Next** to activate the scope.
14. Click **Finish**.
15. Restart the DHCP Server service by right-clicking on the server and selecting **All Actions→Restart**.

Note: You authorized the server after the service was running, so you're restarting now to run in authorized mode.

16. From DHCP Manager, verify the scope is displayed and active. (You may need to refresh).

Configure Server1 in a failover partnership with Server2

Next, you will configure a failover relationship between Server1 and Server2 using the Configure Failover wizard. Perform these steps from Server1.

1. If the DHCP Manager console is not open on Server1, open it now.
2. Right-click on DHCP and select **Add Server**.
3. Type in **Server2** or select it from the authorized server list.

Note: You should now see both servers appearing in the console.

4. Expand DHCP→Server1 then right-click on **IPv4** and select **Configure Failover**.
5. Click **Next**.
6. Type in **Server2** under partner server in **Specify the partner server to use for failover** and click **Next**.
7. On the Configure failover page, switch the mode from Load Sharing to **Hot Standby**.

8. Set the hash password in Shared Secret to **pass@word1** and click **Next**.
9. Click **Finish**.
10. On Server2, open the DHCP console and view the available scopes under IPv4. Confirm that the EvalScope from Server2 is replicated on Server2.

View the failover configuration properties

Once you have configured a failover relationship, you can view status by accessing the Failover tab of the Scope Properties dialog. View and modify settings by accessing the Failover tab of the IPv4 Properties dialog.

1. On Server1, from the DHCP management console, right-click **Scope [192.168.1.0] EvalScope**.

Note that a new menu item is now available called Deconfigure Failover. This menu item indicates that failover is configured for this scope.

2. Right-click **Scope [192.168.1.0] EvalScope**, click **Properties**, and then click the **Failover** tab.

Note that State of this Server and State of Partner Server are both Normal.


3. Click **OK**.
4. Right-click **Ipv4**, click **Properties**, and then click the **Failover** tab. You can select any of the failover relationships listed and click **Edit** or **Delete**.
5. Click **Edit** to view or modify the failover relationship you just created for WINSRV-DC1-WINSRV-1.
6. Click **Cancel** to close the View/Edit Failover Relationship dialog box, and then click **Cancel** to close Ipv4 Properties.

Demonstrate DHCP failover using Server3

Use the following procedures to demonstrate DHCP failover operation. Here are the steps:

- Obtain a new lease on Server3.
- Determine which server has provided a lease to Server3.
- Stop the DHCP service on Server1.

First, verify that Server3 can obtain a new lease from Server2 for the EvalScope.

-  Begin this step logged on to **Server3** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open Network and Sharing Center.
2. Click **Change Adapter Settings**.
3. Bring up the properties for the adapter linked to the Contoso.com domain.
4. Set the IPv4 address to **Obtain Automatically**.
5. Document the IP4 configuration of the following:

- a. IP Address
 - b. Subnet Mask
 - c. DNS Servers
6. Set the IPv4 address to **Obtain Automatically**.
 7. Click **OK**, then click **Close**.
 8. Bring up an Administrative Command Prompt.
 9. Run **IPCONFIG /ALL**.

Note: You should now be obtaining your address from Server1 (192.168.1.94 if you're using the recommended IP4 addresses).

10. Leave the command prompt open.

Stop the DHCP server service on one DHCP server

1. Stop the DHCP server service on Server1: right-click on Server1, point to **All Tasks**, and then click **Stop**.
2. Confirm that the DHCP service is unavailable. The console will display the error message **Cannot find the DHCP Server**.
3. Under Server2 in the DHCP Console, right-click **WINSRV-DC1 Scope [192.168.1.0] EvalScope**, click **Properties**, and then click the **Failover** tab.

Note that State of this Server is now "Lost contact with partner," and State of Partner Server is "Not Available." Click **OK**.

Verify failover operation

1. On Server3, from the command prompt window, type **ipconfig /release** and hit **ENTER**.
2. Type **ipconfig /renew** and hit **ENTER**.
3. Type **ipconfig /all** and hit **ENTER**.
4. Examine the address listed next to DHCP Server.

Note that Server3 has now obtained a lease from the remaining DHCP server in the failover relationship.

Start the DHCP server service and examine events logged

Now you will restart the DHCP server service on the DHCP server that you stopped previously and verify that it successfully rejoins the failover partnership.

1. On the DHCP server you stopped previously, launch the DHCP management console.
2. In DHCP console, right-click the server name, point to **All Tasks**, and then click **Start**.
3. Confirm that the DHCP service is now available. Expand **IPv4**, and select **Scope [192.168.1.0] ClassrScope**.
4. Right-click **Scope [192.168.1.0] Classroom**, click **Properties**, and then click the **Failover** tab. Note that State of this Server is now "Normal". Click **OK**.
5. From the Start screen, type **Event**, and then click **Event Viewer**. Expand **Applications and**

Services Logs, Microsoft, Windows, DHCP-Server.

6. Examine the events logged related to DHCP Failover creation and operation under **Microsoft-Windows-DHCP Server Events/Admin** and **Microsoft-Windows-DHCP Server Events/Operational**.

Deactivate the Scope and set Server3 back to static IP configuration

1. On Server1, from the DHCP management console, right-click **Scope [192.168.1.0] EvalScope** and select **Deactivate**.
- ✓ Begin this step logged on to **Server3** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
2. Open Network and Sharing Center.
3. Click **Change Adapter Settings**.
4. Bring up the properties for the adapter linked to the Contoso.com domain.
5. Set the IP4 configuration of the following (reference your notes from the task **Demonstrate DHCP failover using Server3**, step 5.)
 - d. IP Address
 - e. Subnet Mask
 - f. DNS Servers
6. Click **OK**.
7. Click **Close**.
8. Bring up an Administrative **Command Prompt**.
9. Run **IPCONFIG /ALL**.

Note: You should now be back to the static IP configuration from the beginning of experience.

- ✓ **Continue** on to the *Server Virtualization* experience, which builds on your work in the *Storage* and *Networking* sections. First, **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Table of Contents

Capability Scenarios

Server Virtualization

Get flexible and cost effective virtualization technology



Roles:

Infrastructure admin



Technologies:

Windows Server 2012 R2 Hyper-V



Features enabled in this capability

- Network virtualization
- Extensible switch
- Live migration
- Live storage migration
- Online VHDX resize
- Hyper-V Replica

Virtualization technologies help IT organizations reduce costs and deliver greater agility and economies of scale. New capabilities offer extensible solutions that enable secure multi-tenancy environments.


At Contoso, a new development team working on a secretive project creates its own environment with two development servers running on Windows Server 2012 R2 Hyper-V. Richard is asked to support the team's needs.

The group requires continuous availability for its environment. Meanwhile, Contoso executives express concerns about the need to maintain security and isolation.

- The environment must be isolated from everyone else on the corporate network, although it must use existing network servers and storage.
- Migrating the servers from one Hyper-V host to another must be transparent, and not disrupt the team or any other Contoso users.
- The Contoso customer support group must have access to the new environment once the project becomes available to customers.

Richard makes use of Windows Server virtualization technologies. Hyper-V Network Virtualization and Hyper-V live migration enable him to implement a live migration scenario that maintains isolation regardless of which host the team is using.

With Hyper-V Network Virtualization and Hyper-V extensible switch, Richard can create logical networks that can be used to isolate business units, extend to cloud providers, and be easily managed and extended through System Center Virtual Machine Manager. The virtual network metadata is stored with the virtual machine configuration, which means mobility scenarios will not require reconfiguration.

<p>New levels of performance and cross-platform support</p> 	<h2>IT demands</h2>		
	<p>Support for demanding, critical business workloads</p>	<p>Increased flexibility to move resources and workloads</p>	<p>Leverage existing cross-platform investments</p>
<h2>Windows Server 2012 R2 delivers</h2>			
<p>Enterprise-class scale and performance.</p> <ul style="list-style-type: none"> • Best-in-class performance for Microsoft workloads • Industry-leading 64 TB VHDX virtual disk with dynamic resize • High-performance live migrations with compression or RDMA offload 	<p>Virtual machine mobility.</p> <ul style="list-style-type: none"> • Industry-first shared-nothing live migration • Flexible guest clustering options including shared VHDX files • Multi-node Hyper-V Replica with configurable replication frequency 	<p>First-class citizen guest support for Linux.</p> <ul style="list-style-type: none"> • Full Dynamic Memory support for Linux • Linux integration services included in key standard distributions 	

Richard will use the live migration function of Hyper-V to offer virtual machine mobility without any downtime. Meanwhile, it also allows him to provide failover security and backup and to increase storage space and other resources for the new team as the project grows.

- With SMB application shares, Richard sets up virtual machines as durable data storage. This enables Richard to move resources from one node to another without having to take storage offline.
- Richard also uses Hyper-V and failover clustering to make team resources and virtual machines highly available and minimize disruptions. He can seamlessly migrate the virtual machines to a different host in the cluster in the event of outage or to load balance without impacting virtualized applications.
- Richard also makes use of Hyper-V Replica as a disaster recovery tool. The Hyper-V Replica Replication Tracker encapsulates the replication state of a virtual machine and periodically replicates updates to the virtual hard disks associated with the team's virtual machines to a Replica server.

Windows Server enables Richard to create a multi-tenancy environment in which the small team shares physical servers with the corporate Contoso network while maintaining isolation from the larger network. Windows Server gives him the flexibility to change the level of isolation when the

customer support group needs access. His work also promotes productivity, by keeping team resources highly available, and business continuity, via automated backups.

The following experience shows you how you can build a virtualized infrastructure.

Experience: Build a virtualization infrastructure

Windows Server 2012 R2 Hyper-V includes many enhancements specifically designed to create a highly available, scalable, and powerful virtualization infrastructure. Richard uses Hyper-V and SMB to make team resources and virtual machines highly available, minimize disruptions, and simplify access to shared resources. He can seamlessly migrate the virtual machines to a different node without having to take storage offline. In this experience, you will implement several of these features, as follows:

- Create new virtual machines for use with live storage migration and Hyper-V Replica.
- Perform a live storage migration to a Scale-Out File Server highly available share.
- Perform an online VHDX resize.
- Implement Hyper-V Replica.

Reference Links

This experience builds on the steps in the [Storage](#) and the [Networking](#) experiences. Complete both sections first.

- ✓ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint**. This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

Create new virtual machines for use with live storage migration and Hyper-V Replica

In this step, you will create two new virtual machines that will be used for live storage migration and Hyper-V replica testing.

- ✓ Perform this task logged on to **Host1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.


1. Open Hyper-V Manager.
2. Right-click on **Host1** in the Hyper-V Manager console and select **New**→**Virtual Machine**.

3. On the Before you Begin page, click **Next**.
4. In Name, type Server4, and check the box to store the virtual machine in a different location. Set the location to **D:\VMs**.
5. On the Specify Generation page, keep the default of Generation 1 and click **Next**.
6. On the Startup Memory page, check the box to use **Dynamic Memory** and click **Next**.
7. On the Configure Networking page, select **Eval-Internal** and then click Next.
8. On the **Connect Virtual Hard Disk** page, click **Next**.
9. On the Installation options page, click **Install an operating system from a boot CD/DVD-ROM** and select the **Image file (.iso)** option, then browse to the Windows Server 2012 R2 Installation ISO, then click **Next**. If you don't have an ISO staged on Host1, you can select the option to **Install an Operating System** Later.
10. Click **Finish**.
11. Repeat steps 1-11 to create a second virtual machine named **HV-Rep**.

Perform a live storage migration to Scale-Out File Server highly available share

One of the significant enhancements in Windows Server 2012 R2 is the ability to leverage highly available SMB storage for Hyper-V. In this task, create a new SMB cluster, and then use it to store the newly created virtual machine.

Create a new virtual disk for the Hyper-V data Scale-Out File Server

 Perform this task logged on to **Host1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In Hyper-V Manager, right-click on **Hyper-V Manager**.
2. Click **Add to Server**, browse **Host1** to connect with Hyper-V Manager.
3. Select **Host1** and connect to **Node01**.
4. On Node01, open **Server Manager**.
5. Expand **File and Storage Services**, and verify you have a Storage Pool named **VirtualPool**.
6. Select **VirtualPool**, right-click on the **Virtual Disks** pane, and select **New Virtual Disk**.
7. Click **Next**.
8. Click **Next**.
9. Name the new virtual disk **HVDATA_CSV** and click **Next**.
10. Click **Next** to accept **Simple** resiliency.
11. For Provisioning Type, select **Thin** and click **Next**.
12. For the size, set it to **40 GB** and click **Next**.
13. Click **Create**, then **click** Close.
14. The **New Volume Wizard** should automatically start.
15. Click **Next**.
16. Select the virtual disk **HVDATA_CSV** and click **Next**.

17. Click **Next**.
18. Select **Do Not Assign a Drive Letter** and click **Next**.
19. For the Volume Label, type **HVDATA_CSV** and click **Next**.
20. When the format is complete, click **Close**.
21. Stay logged onto **Node01** for the next task.

Create a new Scale-Out File Server for Hyper-V data

1. Start logged onto **Node01** as **Contoso\Administrator**.
2. On Node01, open **Server Manager**, if it is not already open.
3. From the Tools menu, select **Failover Cluster Manager**.
4. From Failover Cluster Manager, expand **Storage**→**Disks**.
5. You should see **HVDATA_CSV** as available storage.
6. Right-click on **HVDATA_CSV** and select **Add to Cluster Shared Volumes**.
7. The disk should now indicate it's assigned to **Cluster Shared Volumes**.
8. Right-click on **Roles** and select **Configure Role**.
9. Click **Next**.
10. Select **File Server**.
11. Select **Scale-Out File Server for Application Data** and click **Next**
12. Name it **HVDATA** and click **Next**.

You should now see **HVDATA** in the roles. It may take a minute or two for provisioning and propagation to **Node02**. Wait for the role to come online.

Create a new continuous availability share for Hyper-V data

1. Start logged onto **Node01** as **Contoso\Administrator**.
2. Right click on **HVDATA** and select **New Share**.
3. For the type, select **SMB Share for Applications** and click **Next**.
4. For the Server, select **HVDATA** and for the volume, select the **40 GB CSV partition** you just created and click **Next**.
5. Name the share **VMStorage** and click **Next**.
6. Click **Next** on **Configure Share Setting** (CA should already be selected).
7. Click **Customize Permissions**.
8. Click **Add** and then click **Select a Principal**.
9. Click **Object Types**.
10. Check the **Computers** check box, then click **OK**.
11. Type **Host1**; **Host2** (substitute actual host names) and then click **OK**.
12. Check the **Full Control** check box, and then click **OK**
13. Click **OK** to save **ACL** settings, then click **Next**.
14. Click **Create**, then click **Close**.

15. Verify you can browse `\\HVDATA\VMStorage` from both hosts.
16. In the `\\HVDdata\VMStorage` share, create a new folder named **Server4**.

Perform a live storage migration to Scale-Out File Server share

With the ability to move the virtual machine's storage from one location to another without downtime, Richard gains the ability to rebalance his storage across his storage infrastructure and the ability to move the virtual machine storage from a local disk, for example, to a highly resilient Scale-Out File Server.

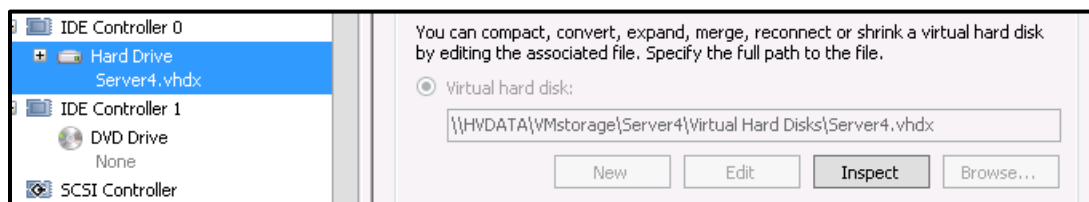
In this step, you will move the VHD storage for the new virtual machine to a highly available file server cluster without incurring downtime on the virtual machine.

- ✓ Perform this task logged on to **Host1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager**.
17. Start **Server4**: it will boot waiting for IFM install.
18. Right-click **Server4**, and then in the Actions pane, click **Move**.
19. Click **Next**.
20. On the **Choose Move Type** page, click **Move the virtual machine's storage**, and then click **Next**.
21. On the **Choose Options for Moving Storage** page, click **Next**.
22. On the **Choose a new location for virtual machine** page, click **Browse**.
23. In the **Select Folder** dialog box, in the **Folder** text box, type `\\HVDData\VMStorage\Server4`, and then click **Select Folder**.
24. On the **Choose a new location for virtual machine** page, click **Next**.
25. Click **Finish**.

Note: Wait for the move to complete before proceeding to the next step.

26. Verify the storage was moved by opening up virtual machine settings for Server4. The virtual hard disk path should now be `\\HVDATA\VMStorage\Server4\Virtual Hard Disks\Server4.Vhdx` as shown in the following screenshot.



- ✓ Perform this task logged on to **Node01** as **Contoso\Administrator** using the password

pass@word1 or the credentials for the domain you created.

27. Open Failover Cluster Manager.
28. Navigate to Roles.
29. Right-click HVData, click Move, and then click Best Possible Node.

Note: The file server is moved to the other cluster node.

TIP: Use Hyper-V Manager to ensure Server4 did not reboot or go offline during this move operation.

Perform an online VHDX resize

In this task, you will work with the new VHDX resize capability in Windows Server 2012 R2. This capability allows you to expand VHDX files for generation 1 virtual machines (SCSI support only), and the generation 2 virtual machines that the virtual machine is running. This improves availability of mission critical virtual machines by allowing you to resize disks which the virtual machine is online.

Add a SCSI disk to Server1 and expand it while the virtual machine is running

1. On Host1, open **Hyper-V Manager**.
2. Right-click on **Hyper-V Host** and select **New→Hard Disk**.
3. Click **Next**.
4. Select VHDX and click **Next**.
5. Select **Dynamically Expanding** and click **Next**.
6. Name the new Disk SCSI_VHD.vhdx.
7. Save the new **SCSI_VHD.vhdx** file in the D:\VHD folder.
8. Click **Next** to accept the default size (127 GB).
9. Click **Next**, then click **Finish**.
10. Right-click in **Server1** and select **Settings**.
11. Click on SCSI Controller, click **Hard Drive**, and click the Add button.
12. Change the location to 1, browse the path to: **D: \VHD\ SCSI_VHD.vhdx**.
13. Click **OK** to save the settings.
14. Check the settings for **Server1** to make sure the VHD shows up under the SCSI controller.
15. Start and connect **Server1**.
16. On Server1, open **Disk Management**.
17. Right-click on the new disk and select **Online**.
18. Right-click on the new disk and select **Initialize**.
19. Initialize the new disk (Disk 1) using MBR.
20. Right-click on the un-allocated space of Disk 1 and select New Simple Volume.

- g. Take the default size (entire disk).
- h. Take the default letter.
- i. Make the volume label Resize.
- j. Perform a Quick Format (NTFS).
- k. Click Finish.

21. Close **Disk Management**.
22. Switch back to Hyper-V Manager.
23. From the Tasks pane, click **Edit Disk**.
24. Browse to D:\VHD\SCSI_Disk.vhdx.
25. Click **Next**.
26. Click **Expand**.
27. Expand the disk to 200 GB.
28. Switch back to Server1 and open **Disk Management**.
29. The new disk should now be 200 GB.

Implement Hyper-V Replica

Hyper-V Replica, introduced in Windows Server 2012, enables an organization to replicate a virtual machine to another host for recovery capabilities in the event of a primary Hyper-V host failure or disaster. Hyper-V Replica has been enhanced in Windows Server 2012 R2 to allow for different syncing intervals as well as tertiary replication.

In this task, you will complete the steps required to implement Hyper-V Replica for your two hosts. You will use the virtual machine, VM-REP. You will make a replica copy of VM-REP on the replica server and test a planned failover. You will configure replication on both servers, and then send the initial replica. First, you will enable Hyper-V Replica for the Primary Server. Perform this step from the host identified as Host 1. To eliminate the need to jump between consoles, add both Hyper-V hosts to one Hyper-V Manager console.

Before you begin

Document the server names in your evaluation lab:

Primary Server (Host 1): _____

Replica Server (Host 2): _____

Here is some background to help you:

- The **Primary Server** is the Hyper-V server that hosts the virtual machine under normal operating conditions.
- The **Replica Server** is the Hyper-V server that has a replica stored on it for DR situations.
- The Primary Server replicates to the Replica Server.

- In this experience, you will create a new virtual machine on the primary server named **VM- REP**. You will set up replication to the replica server and test failover.

Enable replication on HV-REP and send the initial replica

- ✓ Perform this task logged on to **Host1 (Primary Server)** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Enable replication for **HV-REP** using **Hyper-V Manager**.
 - a. In Hyper-V Manager, right-click the **HV-Rep** virtual machine, and then click **Enable Replication**.
 - b. In the Enable Replication Wizard, on the Before you Begin page, click **Next**.
 - c. On the Specify Replica Server page, type the computer name for **Host2** and click **Next**.

Note: If you see this error, “The specified replica server is not configured to receive replication from this server,” click on **Configure Server** and check **Enable this computer as a Replication Server..**

- d. On the Specify Connection Parameters page, click **Next**.
 - e. On the Choose Replication VHDs page, click **Next**.
 - f. On the Replication Frequency page, select the default of 5 minutes and click **Next**.
 - g. On the Configure Recovery Points page, leave only the latest recover point selected, then click **Next**.
 - h. On the Choose Initial Replication Method page, accept the defaults, then click **Next**.
 - i. On the Completing the Enable Replication wizard page, click **Finish**.
2. Right-click on **HV-Rep** and select **Replication**, then **View Replication Health**.
 3. Wait for the replication to finish the first snapshot.
 4. Open **Hyper-V Manager** on **Host2**.
 5. You should see **HV-REP** with a state of **OFF**.

Execute a planned failover

1. Confirm you are working on **Host1 (Primary Server)**.
2. Shut down the **HV-REP** (right click→Turn off).
3. Initiate a **Planned Failover** using Hyper-V Manager:
 - a. In Hyper-V Manager, right-click **HV-Rep**, then click **Replication**, and then click **Planned Failover**.
 - b. In the Planned Failover dialog box, ensure that the **Start the Replica virtual machine after failover** check box is selected, and then click **Fail Over**.
 - c. When the failover has completed, in the **Planned Failover** dialog box, click **Close**.
4. Verify successful failover using **Hyper-V Manager** on **Host2**. The **HV-Rep** virtual machine

should be running on the replica server.

Reverse the failover

1. Confirm that you are working on **Host2 (Replica Server)**.
5. Shutdown the **HV-REP** virtual machine (right-click→Turn off).
6. Switch to Host1, in Hyper-V Manager.
7. Right-click **VM**, then **Replication**, and then select **Cancel Planned Failover**.
8. Verify cancellation of planned failover using **Hyper-V Manager**.

✓ **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

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Contents

Capability
Scenarios

Server Management and Automation

Automate maintenance tasks and processes



Role:

Infrastructure admin



Technologies:

Windows Server 2012 R2 Server Manager

Windows Server 2012 R2 PowerShell




Features enabled in this capability

- AD DS Deployment Automation
- Windows Remote Management 3
- IP Address Management (IPAM)
- Storage Spaces

IT departments face continually increasing demands. While IT budgets remain the same, the IT team needs to deliver management capabilities and automation to help meet escalating needs.

At Contoso, there is a server farm at headquarters and a server in each regional office. Each office has its own small HR and accounting groups, reporting back to the corporate human resources and accounting departments at headquarters. The human resources and accounting applications are installed on the server at each regional office. The data generated by these applications are merged every two hours into the database residing on the headquarters servers. Each region also has multiple sales facilities reporting to the regional office.

<p>Increased management efficiency for a diverse datacenter</p> 	<h2>IT demands</h2>		
	<p>Consistent management of diverse datacenter resources</p>	<p>Efficient, local and remote management of server resources</p>	<p>Cost-effective management of more tasks</p>
<h2>Windows Server 2012 R2 delivers</h2>			
<p>Standards-based management.</p> <ul style="list-style-type: none"> • Windows Management Framework • Standards-based switch management 	<p>Simplified multi-server management.</p> <ul style="list-style-type: none"> • Server Manager • Windows Server Essentials Experience 	<p>Robust automation.</p> <ul style="list-style-type: none"> • Windows PowerShell 4.0 • Intellisense integrated scripting environment • Desired State Configuration 	

The multiple application copies are a maintenance issue. Each time a patch or update becomes available, the Contoso IT staff manually installs it on each server. IT employees also manually check the database update schedule on the regional servers, and monitor the available storage space on the headquarters servers. This storage space fills up quickly. Also, HR and accounting do not always work with current data, due to the update schedule. Contoso faces similar issues with the sales facilities servers.

The Contoso infrastructure administrator, Richard, wants to improve server management and add automation capability by giving the regional offices real-time access to the corporate HR and accounting databases and by automating key functions, including software patch and update installation, sales and inventory data uploads, and main server storage monitoring. He also wants the flexibility of web access to administrative controls.

He implements these improvements by using Windows PowerShell and Server Manager in Windows Server 2012 R2 and the following features:

- AD DS Deployment Automation
- PowerShell over DISM.EXE for servicing and automating the software update process
- Windows PowerShell Web Access and Windows Remote Management 3 (WinRM3) for remote multi- server and downstream server management
- IPAM for centralized IP address space management to eliminate IP address conflicts
- Storage Spaces

Additionally, Windows Server helps Richard's IT employees monitor the network more efficiently because it enables them to assign the servers to functional groups and to manage the servers from a single console.

Take a look at one experience that can help you learn to use Server Manager and Windows PowerShell 4.0 to manage Windows Server.

Experience: Use Server Manager and Windows PowerShell 4.0 to manage Windows Server

In this experience, you will learn how the Server Manager and Windows PowerShell framework in Windows Server deliver an enhanced, multi-server management experience to help infrastructure admins like Richard perform tasks such as multi-server management. You will also explore new Windows PowerShell capabilities including new cmdlets and the Windows PowerShell gateway.

After completing this experience, you will be able to:

- Use Server Manager to manage multiple servers.
- Use Windows PowerShell to perform server management.
- Implement Windows PowerShell Web Access.

✓ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint**. This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance..

Use Server Manager to manage multiple servers

In this task, use the new multi-server and remote server management capabilities of Server Manager to deploy roles and features on multiple servers in your environment. While doing these exercises, you may have to scroll left and right in Server Manager. Server Manager is optimal when viewed with a minimum of 1366x768 screen resolution. You may wish to adjust your resolution for this.

Create a new remote server group

Use Server Manager to create a new remote server group. Remote server groups enable you to have a simplified focused view of configuration, events, alerts and performance of a related group of servers that you define. Information is summarized in a tile, as well as viewable as a report.

✓ Begin this step logged on to **DC01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Server Manager**.
2. In **Server Manager**, click **Add other servers to manage**.
3. Click **Find Now**.
4. Click **Node01**, and then click the arrow to the right to add the computer.
5. Highlight **Node01**, **Node02**, **Server1**, and **Server2**, and then click the arrow to the right to add the computers.
6. Click **OK**.

7. In **Server Manager**, click **Dashboard**, and then click **Create a server group**.
8. In the Server group name text box, type **Infrastructure-Servers**.
9. Highlight **Node01**, **Node02**, **Server1** and **Server2** then click the **Add** button.
10. Click **OK**.
11. In the left pane, click **Infrastructure-Servers**.

Note: You can view summarized information for just those servers.

Using dashboards

In this step, review the automatic dashboard tiles that Server Manager creates to provide overall health of the servers.

- ✓ Begin this step logged on to **DC01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In Server Manager, click **Dashboard**.
2. Scroll down and review **Infrastructure-Servers**.
3. In the Infrastructure-servers tile, scroll down and verify **Services** and **Events**.

Note: You can filter based on Startup types, Services, Service status and Servers.

Note: It may take a few moments for any services to appear in the list.

4. Click **Infrastructure-Servers**.
5. Highlight **NODE01** and **NODE02**.

Note: All events are filtered to those nodes.

6. Scroll down and review **Roles and Features**.

Note: All installed roles and features are listed.

Use remote management tools

In this step, use Server Manager to open a Windows PowerShell remote session.

- ✓ Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. In Server Manager, click **All Servers**, and then click **Server1**.
2. Right-click **Server1**, and then click **Windows PowerShell**.

Note: Windows PowerShell opens with a remote session on Server1.

3. Close the **Windows PowerShell** console.

Track performance using performance counters

In this step, use Server Manager to manage performance counters.

- ✓ Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. In Server Manager, navigate to **All Servers**, and then highlight **Server1** and **Server2**.
2. Scroll down to **Performance**.

Note: After creating server group, it will take a few moments to display the servers in the performance table.

3. Right-click **Server1**, and then click **Start Performance Counters**.
4. Right-click **Server2**, and then click **Start Performance Counters**.

Note: The status is Waiting for data. In a production environment, Server Manager will show historical performance data for these servers after a short time.

Perform a BPA scan on Infrastructure-Servers

In this step, use Server Manager to perform a Best Practices Analyzer (BPA) scan.



- ✓ Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. In Server Manager, click **Local Server**, and then scroll to **Best Practices Analyzer**.
2. In Tasks, click **Start BPA scan**.

Add roles and features to a remote server

- ✓ Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. In Server Manager, click **Manage**, and then click **Add Roles and Features**.
2. Click **Next**.
3. Accept the default of **Role-based** or **Feature-based installation**, and then click **Next**.
4. Click **Server1**, and then click **Next**.
5. In Roles, select **Print and Document Services**, and then click **Add Features**.
6. Click **Next**.


7. In Features, select **Windows TIFF IFilter**, and then click **Next**.
8. Click **Next** at each step in the wizard, and then click **Install**.
9. Click **Close**.
10. Click the **Notification area** (flag icon)  to view the status of the installation.
11. When the installation is completed, click **Refresh** () in Server Manager.
12. In the left pane, click **Print Services**.

Note: Server Manager allows you centrally view information on roles, even if those roles are not installed on the local server.

13. Scroll to view information related the listed print and document servers.

Remove roles and features from a remote server

In this step, you will user Server Manager to remotely remove servers.

 Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. In Server Manager, click **Print Services**.
2. Click **Manage**, and then click **Remove Roles and Features**.
3. Click **Next**.
4. Click **Server1.Contoso.com**, and then click **Next**.
5. Clear the **Print and Document Services** check box, and then click **Remove Features**.
6. Click **Next**.
7. Click **Next** at each step in the wizard, and then click **Remove**.
8. Click **Close**.
9. Click the **Notification Area** to view the status of the removal.


Note: The Print Services tile and node are removed from the Server Manager UI. If Print Services does not remove right away, click Refresh.

Use Windows PowerShell to perform server management

In this step, explore using the Windows PowerShell provider for Server Manager to deploy new roles and features to multiple remote servers.

Explore the Windows PowerShell Provider for Server Manager

In this step, use some of the Windows PowerShell commands for Server Manager.

 Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. Open **Windows PowerShell**.

2. Type the following commands, pressing **ENTER** after each one. When prompted, type **N**, and then press **ENTER**.

```
↪ Get-Command -Module ServerManager
↪ Get-Help Add-WindowsFeature
```

Note: Add-WindowsFeature is replaced with Install-WindowsFeature in this version of Windows.

Note: You were not required to import the Server Manager module; all modules are automatically available.

```
↪ Get-WindowsFeature
```

Note: The list of Windows Features is provided, with an (X) indicating which features are installed.

```
↪ Get-WindowsFeature | Where Installed -eq $true
↪ Get-WindowsFeature -ComputerName Server1 | Where
Installed - eq $true
```

Note: Windows PowerShell 3.0 offers a simplified syntax, eliminating the need for \$_. And {}.

Use Windows PowerShell and Server Manager to convert a graphic user interface (GUI) installation to a Server Core installation

In this step, use Windows PowerShell and Server Manager to remotely remove the GUI from a server, converting it into a Server Core installation.

1. Log on to **Server1** using the username **Contoso\Administrator** and the password **pass@word1** or the credentials for the domain you created.

Note: Note the full Windows desktop is installed on this server.

2. Switch to **DC01**.
3. Go to **Server Manager**.
4. Click **All Servers**.
5. Right-click **Server1**, click Windows **PowerShell**.
6. Type the following commands, pressing **ENTER** after each one:

```
↪ Get-WindowsFeature -name User-Interfaces-Infra-
ComputerName Server1
↪ Remove-WindowsFeature -name Server-Gui-Mgmt-
Infra - ComputerName Server1
```

Note: Wait for the feature removal to complete before proceeding to the next step.

7. Switch to **Server Manager**.

8. Click **All Servers**.
9. Right-click **Server1**, click **Restart Server**, and then click **OK**.

Important

Wait for the computer to restart, and then complete the feature removal. This will remove the feature and all dependent features.

Note: You can view the console on Server1 to monitor the progress of this job.

10. Log on to **Server1** using the username **Contoso\Administrator** and the password **pass@word1** or the credentials for the domain you created.

Note: Notice the Server Core Desktop

Important

After GUI removal, if you do not see the Windows logon screen on Server1, click on the lower part of the desktop and drag upward.

11. At the command prompt, type **MMC**, and then press **ENTER**.

Note: MMC consoles are not available.

12. At the command prompt, type **SCONFIG**, and then press **ENTER**.

Note: SConfig is still available.

13. Type the number **15**, and then press **ENTER** to return to the command prompt.

Use Windows PowerShell and Server Manager to convert a Server Core installation to a GUI installation

In this step, use Windows PowerShell and Server Manager to remotely add the GUI to the Server Core computer.

- ✓ Begin this step logged on to Server1 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. At the command prompt, type **PowerShell**, and then press **ENTER**.
2. Type the following commands, pressing **ENTER** after each one:
 - ↪ `Install-WindowsFeature -Name Server-GUI-MGMT-Infra`
 - ↪ `Restart-Computer`

Important

Wait for the computer to restart, and then complete the feature installation. This will add

the Server GUI feature and all dependent features.

3. Log on to **Server1** using the username **Contoso\Administrator** and the password **pass@word1** or the credentials for the domain you created.

Note: Note the Server Core desktop.

4. Type **ServerManager**, and then press **ENTER**.

Note: Server Manager is available in a graphical form on Server Core.

5. Click **Tools**, and then click **Computer Management**.

Note: MMC-based administration tools function as expected.

6. Close **Server Manager**, and then close **Computer Management**.

7. Type **MMC**, and then press **ENTER**.

Note: You can also create custom MMC tools.

8. Close MMC.

Implement Windows PowerShell Web Access

Install and configure Windows PowerShell Web Access, and use it to manage multiple computers from a browser session. Windows PowerShell Web Access allows you to use a browser-based console to perform management of any server with remote management enabled by connecting to a single gateway, which can be externally facing.

Install Windows PowerShell Web Access

In this step, install Windows PowerShell Web Access.

- ✓ Begin this step logged on to DC01 as Contoso\Administrator using the password pass@word1 or the credentials for the domain you created.

1. In Server Manager, click **Dashboard**.
2. Click **Add roles and features**.
3. Click **Next** twice, select **DC01.contoso.com**, and then click **Next**.
4. Click **Next** at each step of the wizard until you reach the **Select features page**.
5. Expand **Windows PowerShell (Installed)**, check **Windows PowerShell Web Access**, click **Add Features**, and then click **Next**.
6. Click **Install**.
7. When the installation has completed, click **Close**.

Configure Windows PowerShell Web Access

In this step, configure Windows PowerShell Web Access by installing the web application and configuring a predefined gateway rule.

1. Click Windows PowerShell.
2. Type the following command, and then press ENTER:

```
↵ Install-PswaWebApplication -useTestCertificate
```

Note: This command will create the test certificate and the SSL binding using that certificate. The certificate can be adjusted at any time using IIS Manager.

3. Type the following command, and then press **ENTER**:

```
↵ Get-PswaAuthorizationRule
```

Note: There are presently no users permitted to access Windows PowerShell Web Access.

4. Type the following command, and then press **ENTER**:

```
↵ Add-PswaAuthorizationRule -ComputerName * -  
UserName * - ConfigurationName *
```

Note: This is a basic “allow-all” rule that relies on the user permissions and individual server configuration. You can create a more restrictive rule for production environments.

5. Type the following command, and then press **ENTER**:

```
↵ Get-PSWAAuthorizationRule
```

Note: There is now a rule which grants all users access to Windows PowerShell Web Access, and the ability to access any system on the network, providing they have rights on the target system.

Perform remote management with Windows PowerShell Web Access

In this step, use Internet Explorer 10 to validate Windows PowerShell Web Access.

- ✓ Begin this step logged on to DC01 as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Click **Start**, and then right-click **Internet Explorer**.
2. Click **Run as different user**.
3. Log on as **.\administrator** with a password of **pass@word1**.
4. Navigate to <https://DC01>.
5. Click Continue to this website (not recommended), and then click OK.

Note: You receive this error because you are using a test certificate that

cannot be validated.

6. In the Username text box, type **Contoso\Administrator**.
7. In the Password text box, type **pass@word1**.
8. In the Computer name text box, type **Server1**, and then click **Sign In**.
9. Wait for the Windows PowerShell console to appear.
10. Type the following commands, pressing **ENTER** after each:

```
↵ HostName
↵ Get-Process
↵ Get-Service | where status -eq running
```

Note: You have full Windows PowerShell access via the browser.


-  **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Table of
Contents

Capability
Scenarios

Virtualized Desktop Infrastructure

Enable modern work styles



Role:

Infrastructure admin



Technology:


Windows Server 2012 R2



Features enabled in this capability

- Session shadowing.
- Storage tiering and disk deduplication.
- Dynamic display handling and quicker reconnects.
- Improved RemoteApp experience.

As the enterprise adapts to more personally owned devices, IT needs a way to offer a consistent, managed enterprise desktop to employees. Microsoft Virtual Desktop Infrastructure (VDI) enables IT to deliver a corporate desktop and applications to employees that can be accessed from their personal or corporate devices, from both internal and external locations. Centralized desktops and apps hosted in the datacenter or cloud can be easily managed, and apps and data can be secured.

<p>Great performance, easy to deploy and cost-effective</p> 	<h3>IT demands</h3>		
	<p>Simplified roll-out and administration of a VDI environment</p>	<p>Reduced time and cost to deploy virtual desktops and applications</p>	<p>Consistent Windows experience across devices</p>
<h3>Windows Server 2012 R2 delivers</h3>			
<p>Efficient VDI management.</p> <p>Wizard-based, automatic setup and deployment Unified administration of published applications and desktops User profile disk</p>	<p>Best value for VDI.</p> <p>Support for multiple, lower cost storage options Read-write VDI storage de-duplication for increased VM density and reduced cost</p>	<p>Rich user experience.</p> <p>RemoteFX for WAN RemoteFX Adaptive Graphics Support for physical and software GPU</p>	

Richard is the infrastructure admin at Contoso. In the past, computers were all corporate-owned

and Richard deployed a standard desktop image to the machines that included a standard set of policies and applications. As more people move to using their own computers, laptops, and tablets, often from non- corporate networks, Richard needs a way to enforce the same security policies to protect data, while enabling access to applications on devices that his company no longer directly manages.

IT needs a way to deploy a standard desktop solution that can be housed centrally in the datacenter. These virtual desktops will be accessed from a variety of devices and locations, while preserving the protection of the data, including limiting the ability to store the data on an unmanaged device.

Note: For more information about the Microsoft strategy for People-Centric IT, which enables the consumerization of IT without compromising compliance, see the [Enabling People Centric IT guide](#) and the System Center 2012 R2 Configuration Manager [resources](#).

Windows Server provides a VDI toolset that's easy to deploy and configure, and it delivers a rich user experience. The Microsoft solution gives IT the freedom to choose personal and pooled virtual machine- based desktops, as well as session-based desktops. It also offers IT several storage options, based on their requirements.

Windows Server continues to improve the options and user experience for deploying and managing a VDI environment, as well as for improving users' experience with remote desktops:

- Windows Server provides a single console to deploy, configure, and manage a VDI deployment. Windows Server brings Session Shadowing to the administration console, enabling help desk or IT staff to view and remotely control a user's session.
- Windows Server supports SMB 3.0 and Storage Spaces for VDI storage, providing a high-performance storage alternative to expensive SAN storage. Windows Server 2012 R2 further expands on this by supporting online disk deduplication, which reduces the amount of space on disk that's consumed by personal virtual machines. It also provides support for storage tiering, enabling IT to use a mix of solid state and spinning disks to create a storage volume that automatically optimizes locations of data across the disks so that the most accessed data blocks are on the highest-performing disks.

The following experience shows you how to provide secure remote user access.

Experience: Provide secure remote user access

In this experience, configure a secure remote experience for employees of Contoso, Inc. This experience uses both RemoteApp and VDI to allow those users to work securely on remote applications from home computers.

Reference Links

For some additional guidance, see the following Microsoft articles:

[Installing and Configuring DHCP role on Windows Server 2012](#)

[Installing IIS 8 on Windows Server 2012](#)



Before beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint**. This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

In this experience, you will set up user access to a remote application via RemoteApp and Virtual Desktop Infrastructure (VDI). VDI makes it possible for users to access your system from virtually anywhere, providing a rich experience while ensuring enhanced data security and compliance. The VDI implementation is based on session desktop using Remote Desktop Services. First enable RemoteApp and publish Microsoft Office 2013 applications. Then configure the user with access to a full desktop located on the corporate network.

Install and configure Remote Desktop Services

In this step, use Server Manager to establish session-based VDI and RemoteApp publishing.



Begin this step logged on to **Server2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Server Manager**.
2. On the dashboard, select **Add other servers to manage**.
3. Search for Server1 in the **Name (CN)** field.
4. Select **Server1** from the list and click the sideways arrow to add it to the server pool.
5. Once added, return to the dashboard.
6. Click **Add roles and features**.
7. On the Before you Begin page, click **Next**.
8. On the Installation Type page, click **Remote Desktop Services** installation, and then click **Next**.
9. On the Deployment Type page, click **Quick Start**, and then click **Next**.
10. On the Deployment Scenario page, click **Session-based desktop deployment**, and then click **Next**.
11. On the **Server Selection** page, click **Server2.contoso.com** in the **Server Pool** box, click **Add** (the right arrow button), and then click **Next**.
12. On the Confirmation page, check the **Restart the destination server automatically if**

required check box, and then click **Deploy**.

Note: The installation and configuration will take approximately four minutes. Wait for this to complete before proceeding.


13. When the installation has completed, click **Close**.

Create a self-signed certificate

In this step, you will create a certificate you can use to test secure remote access. A self-signed certificate is an alternative to purchasing a certificate or creating a certificate authority in instances for some use cases:

- On an intranet: When clients only have to go through a local intranet to get to the server, there is virtually no chance of a man-in-the-middle attack.
- On an IIS development server: This eliminates the need to buy a trusted certificate when you are developing or testing an application.
- On personal sites with few visitors: If you have a small personal site that transfers non-critical information, there is very little incentive for someone to attack the connection.

Note: When connecting to an IIS site that uses a self-signed certificate, visitors will see a warning in the browser until the certificate is permanently stored in the user's certificate store. Never use a self-signed certificate on an e-commerce site or any site that transfers valuable personal information like credit cards or social security numbers.

 Begin this step logged on to **Server2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In the Server Manager, select **IIS**.
2. Select **Server2** and right-click on **Internet Information Services (IIS) Manager**.
3. In the Connections column on the left, click and expand **Server2**.
4. Double-click on **Server Certificates** located in the center column.
5. In the Actions column on the right, click on **Create Self-Signed Certificate**.
6. Enter **Server2Cert** as the friendly name and **Personal** as the certificate store, then click **OK**.
7. You now have an IIS Self Signed Certificate valid for 1 year listed under Server Certificates.
8. Under your Server Certificates, select **Server2Cert** and from the Actions column, select **Export**.
9. Export to: **C:** as **Server2Cert.pfx** and set the password to **pass@word1** or the credentials for the domain you created.

Configure a publishing certificate

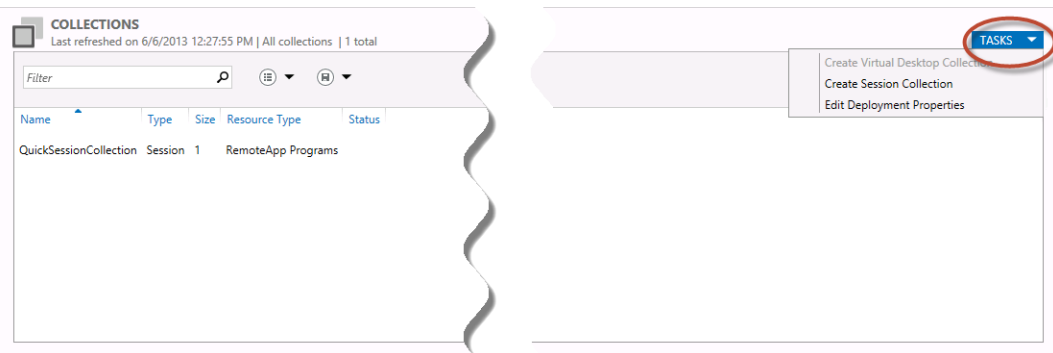
Review the results of Quick Setup and configure a publishing certificate using a wildcard certificate.

- ✓ Begin this step logged on to **Server2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In Server Manager, click **Remote Desktop Services**.

Note: Server Manager is optimized for a minimum screen size of 1366x768. If possible, you may wish to adjust your desktop resolution to this value.

2. In Server Manager, scroll through and review the installed roles and services for **Remote Desktop Services**.
3. In left navigation, click **Collections**.
4. On the Collections Tasks menu, click **Edit Deployment Properties**.



5. In left navigation of Deployment Properties, click **Certificates**.
6. Under Manage certificates, click **RD Connection Broker – Enable Single Sign-On**.
7. Click **Select existing certificate**.
8. Click **Browse** and browse to **C:**.
9. Click **Server2Cert.pfx**, and then click **Open**.
10. In Password, type **pass@word1** or the credentials for the domain you created.
11. Check the **Allow the certificate to be added** check box, and then click **OK**.
12. Click **Apply**.
13. Repeat steps 6 through 12 for **RD Connection Broker – Publishing**, and for **RD Web Access**.
14. Click **OK**.

Test RemoteApp publishing

In this step, test RemoteApp publishing to validate that it is functioning.


- ✓ Begin this step logged on to **Server2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Internet Explorer**.
2. Navigate to **https://Server2.contoso.com/rdweb**.
3. When you are prompted with a website stating that there is a certificate error, ignore the message, and click the **Continue to this site** hyperlink.
4. Click **Allow to run the RDS web add-on**.
5. Check the **This is a private computer** check box.

6. Log on as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
7. Click **WordPad**, and then click **Connect**.
8. In the **Connecting to Server2.Contoso.com** window, click **OK**.
9. Close **WordPad**.
10. Close **Internet Explorer**.

Enable session-based VDI


Add session-based VDI to your Remote Desktop Services configuration. Because session-based VDI and RemoteApp programs cannot co-exist on the same RDS server, you will first remove the RemoteApp programs. If you wish to publish both session desktops and RemoteApp programs, you can add a second RDS server to the deployment.

 Begin this step logged on to **Server2** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Switch to **Server Manager**.
2. Click **Remote Desktop Services** from left pane and click **Collections**.
3. In the Contents pane, right-click **QuickSessionCollection**, and then click **RemoveCollection**.
4. Click **Yes**.
5. On the Tasks menu, click **Create Session Collection**.
6. On the Before you Begin page, click **Next**.
7. In Collection Name, in Name, type **Session Desktops**, then click **Next**.
8. Click **Server2.contoso.com**, click **Add**, then click **Next**.
9. In User Groups, use the pre-populated default settings, then click **Next**.
10. In User Profile Disks, in Location of user profile disks, type **c:\UserDisks**, then click **Next**.
11. Click **Create**.
12. When the process completes, click **Close**.

Test session-based VDI

In this step, test the session-based VDI configuration.

 Begin this step logged on to **DC001** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Internet Explorer**.
2. Navigate to **https://Server2.contoso.com/rdweb**.
3. Click **Allow to run the RDS web add-on**.
4. Check the **This is a private computer** check box.
5. Log on as **Contoso\Administrator** using the password **pass@word1**.
6. Click **Session Desktops**, and then click **Connect**.
7. Click **OK**.

8. On the **RDP control toolbar**, click **Close**, and then click **OK**.

✓ **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.x`

Table of
Contents

Capability
Scenarios

Access and Information Protection

Enable consistent access to corporate resources



Role:

[Infrastructure admin](#)



Technologies:

[Windows Server 2012 R2](#)

[System Center 2012 R2 Configuration Manager](#)



Features enabled in this capability

- Single user identity across Active Directory and Windows Azure Active Directory.
- Conditional access policies through the Web Application Proxy and AD FS.
- Additional authentication using PhoneFactor.
- Secure remote access using Routing and Remote Access service (DirectAccess and automatic (VPNs).
- Sync work files from a File Server to devices with Work Folders.

The prevalence, speed, and availability of affordable high-speed broadband and Wi-Fi networks means that employees expect to be mobile and still get their work done. People expect to access corporate resources in a consistent way across devices, and they expect that the technology provided will be available on their schedule, from wherever they happen to be. This work-from-anywhere paradigm requires the IT organization to change the way workers access resources such as company tools, apps, data, and services.

<p>Consistent and flexible user access to corporate resources while protecting data</p> 	<h2>IT demands</h2>		
	<p>Controlled access to corporate data from user's device of choice</p>	<p>Common user identity to access on-premises and cloud resources</p>	<p>Protect corporate data and maintain regulatory compliance</p>
<h2>Windows Server 2012 R2 delivers</h2>			
<p>Always-on remote access from trusted devices.</p> <ul style="list-style-type: none"> • Workplace Join • Web Application Proxy • Automatic VPN connections • Work Folders 	<p>Seamless, single sign-on access to application and data.</p> <ul style="list-style-type: none"> • Windows Server Active Directory • Windows Azure Active Directory • Active Directory Federation Services 	<p>Policy-based access and audit of corporate information.</p> <ul style="list-style-type: none"> • Dynamic Access Control • Active Directory Rights Management Services • Multi-factor authentication 	

Paul, a human resources manager at Contoso, considers himself a savvy consumer of technology. As an early adopter of new mobile technology as it becomes available in the market, Paul now finds that his personal device has outpaced the device provided for him at work. Paul wants to be able to use his personal, more flexible and powerful device from home to review the résumés of applicants prior to their job interviews.

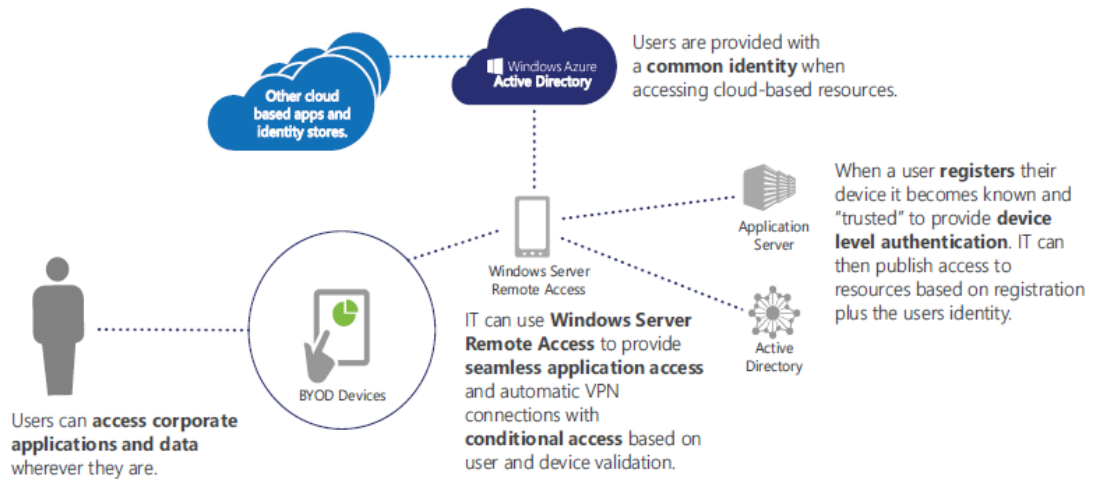
Paul needs an easy way to access corporate apps and data from any device he chooses to use. The IT organization needs an efficient way to provide Paul with consistent access to corporate resources from his personal devices.

While the IT team at Contoso has previously forbidden the use of personal devices, it has recently implemented a Microsoft solution for streamlined device management. When a user enrolls a device for management, the company portal is installed on the device. This company portal is consistent across devices, and it makes the latest corporate applications available to users.

Note: For more information about the Microsoft strategy for People-Centric IT, which enables the consumerization of IT without compromising compliance, see the [Enabling People Centric IT guide](#) and the System Center 2012 R2 Configuration Manager [resources](#).

System Center 2012 R2 Configuration Manager enables users to self-provision applications:

- A company portal shows the applications users have permissions to install. Users can view, install, and run corporate applications across devices.
- The IT team can specify which applications people can see in the company portal based on a defined user role (for example, finance managers or group managers) or groups within Active Directory. See the following diagram.



Work Folders, new in Windows Server 2012 R2, enable users to store the data they need for work in a single place and make it easy for users to sync data across devices:

- Using Work Folders, employees can sync files stored in their Sync Share on a corporate file server with their devices. This share can be integrated by the IT team with Dynamic Access Control for automated classification and protection of documents based on their content. These changes are replicated to the user's devices.
- The IT team controls access through Web Application Proxy, which publishes resources with multi-factor authentication and conditional-access policies.

The following experience shows you how to provide secure remote user access.

Experience: Provide secure document access

In this experience, configure a secure remote experience for employees of Contoso, Inc. You will grant those users access to secure files via Dynamic Access Control by modifying properties of the user accounts.

Prerequisites

This experience requires additional software setup and configuration.

- [Install and configure Active Directory-Rights Management Services](#) on DC01.
- [Create a new user account in Active Directory](#) for BenSmith using this TechNet reference.

References

For some additional guidance, see the following Microsoft article:

[Deploying and Configuring Information Rights Management](#)

- ✓ **Before** beginning this experience, create checkpoints of all your virtual machines. To do this, right-click on the virtual machine and select **Create Checkpoint**. This will enable you to restore to a clean environment if required. Checkpoints use up resources and will impact system performance.

With Dynamic Access Control, Richard can ensure that remote users access only documents to which they have permission, based on the attributes of the document and the attributes of their user account. Review the specifics of the implementation before working with documents and rules.

Create a new personally identifiable information (PII) rule

Create a new rule which grants access to files containing personally identifiable information (PII) only to approved users. This rule is then applied to a user group called PII-Approved to grant them read-only access.

- ✓ Begin this step logged on to **DC01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.
1. In Active Directory Administrative Center, click **Resource Properties**.
 2. Right-click **Personally Identifiable Information (PII_MS)**, and then click **Enable**.
 3. Click **Central Access Rules**.
 4. In the Tasks pane, click **New**, and then click **Central Access Rule**.
 5. In Name, type **Contains-PII**.
 6. In Target Resources, click **Edit**.
 7. Add the condition **[Resource] [Personally Identifiable Information] [Exists]**
 8. Click **OK**.
 9. In Permissions, click **Use the following permissions as current permissions**, and then click **Edit**.
 10. Double-click the entry **Owner Rights**, and then click **Add a condition**.
 11. Add the condition **[Resource] [Personally Identifiable Information] [Any of] [Value] [Not PII, Public]**, and then click **OK**.
 12. Click **Add**.
 13. Click **Select a principal**.
 14. Type **PII_Approved**, and then click **Add a condition**.
 15. Add the condition **[Resource] [Personally Identifiable Information] [Any of] [Value] [High, Low, Moderate]**.
 16. Check the **Full Control** check box, and then click **OK**.
 17. Click **OK**.
 18. Click **OK**.
 19. Click **Central Access Policies**.
 20. In **New**, click **Central Access Policy**.
 21. Name as **File-Server-Policy**.
 22. In Member Central Access Rules, click **Add**.
 23. Click **Contains-PII**, click **Add (>>)**, and then click **OK**.

24. Click **OK** to close File-Server-Policy.

Review manual file classification on Server1

Implement file classification on Server1 by classifying folders and testing the results of folder classification.

- ✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

Note: If available, you may log on directly to Server1, or you may use Remote Desktop to connect to Server1. Interactive logon is required as the property pages in question are only available locally.

1. Open **Server Manager**.
2. Go to **Server Roles** and expand **File and Storage Services**.
3. Select **File Server** and **File Server Resource Manager**.
4. Click **Next** and **Install**.
5. Open **Windows PowerShell**.
6. Type the following commands, pressing ENTER after each one.
 - ↪ `Gpupdate /force`
 - ↪ `Update-FSRMClassificationPropertyDefinition`
7. Open **Windows Explorer**.
8. Navigate to **C:\Shares\CorpData**.
9. Right-click **CorpData**, and then click **Properties**.
10. Click the **Classification** tab.

Note: The folder has been previously classified manually as United States and Sales.

Note: Personally Identifiable Information classification has not been configured.

11. Close all open windows.

Implement automatic classification for files containing PII

Configure an automatic classification rule which will search for files containing a US social security number and then classify them as "High PII."

- ✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Server Manager**.
2. On the Tools menu, click **File Server Resource Manager**.

3. Expand **Classification Management**, and then click **Classification Properties**.

Note: Country, Department, and Personally Identifiable Information are all deployed via Group Policy as part of the global properties stored in Active Directory.

4. Click **Classification Rules**.
5. In the actions pane, click **Create Classification Rule**.
6. In General, in Rule name, type **SSN Classifier**.
7. In Scope, check the **User Files** check box, and then click **Add**.
8. In the Browse for Folder window, navigate to **C:\Shares\CorpData**, and then click **OK**.
9. In **Classification**, in **Classification method**, select **Content Classifier**.
10. In Property, in **Choose a property to assign to files**, select **Personally Identifiable Information**.
11. In **Specify a value**, select **High**.
12. Click **Configure**.
13. On the **Parameters** tab, in the first entry, in the **Expression** field, type the following regular expression, and then click **OK**.

↪ `\d{3} - \d{2} - \d{4}`

Note: This is a regular expression for a US SSN format.

14. In Evaluation Type, check the **Re-evaluate existing property values** check box, and then select **Overwrite the existing value**.
15. Click **OK**.
16. In the Actions pane, click **Configure Classification Schedule**.
17. Check the **Enable fixed schedule** check box, and then check each of the seven weekdays.
18. Check the **Allow continuous classification for new files** check box.
19. Click **OK**.
20. Leave File Server Resource Manager open for use in the next step.

Validate Dynamic Access Control rules

Use the built-in Effective Access calculator to verify that only users with permissions can access the CorpData folder based on Dynamic Access Control rules.

- ✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open Windows Explorer.
2. Navigate to **C:\Shares\CorpData**.
3. Right-click **CorpData**, and then click **Properties**.
4. On the Security tab, click **Advanced**.
5. Click **Effective Access**.
6. Click **Select a user**.

7. Type **AliceCiccu**, and then click **OK**.
8. Click **View effective access**.

Note: Alice is denied access because her user attributes do not match the requirements for the folder.

9. Click **Select a user**.
10. Type **BenSmith**, and then click **OK**.
11. Click **View effective access**.

Note: Ben is allowed access, because his user account is configured with the correct attributes, based on the new account you set up in Active Directory as one of the prerequisites for this experience.

12. Close the **Properties** of the **CorpData** folder.

Test Dynamic Access Control with automatic classification

Test access to files using Dynamic Access Control and file classification from your DirectAccess-connected computer.

- ✓ Begin this step logged on to **Server3** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open Windows Explorer.
2. Navigate to `\\Server1\CorpData`.
3. Using Microsoft Word, create and save a file named **SecureData**, with the following text in the **CorpData** folder.

→ My SSN is 111-22-3333

4. Wait approximately 10 seconds.
5. Open **SecureData.docx**.

Note: You are now denied access because of the Personally Identifiable Information rule.

6. Switch to **Admin**, ensuring you are logged on as **Contoso\Administrator**.
7. Open **Windows PowerShell**.
8. Type the following command, and then press **Enter**.
↵ `Add-ADGroupMember -Identify PII_Approved -Members BenSmith`
9. Switch to **Server3**.
10. Log off and then log on as **Contoso\BenSmith** using the password **pass@word1** or the credentials for the domain you created.
11. Open the file `\\Server1\CorpData\SecureDat.docx`.

Note: You can now open the file because you have been approved to view PII.

Implement Automatic Protection of PII Documents with Rights Management Services

Implement an Active Directory Rights Management Services (RMS) policy which prevents printing of documents classified as PII. If you have installed Active Directory RMS on Server1 according to the prerequisites, you will only have to create the RMS policies.

Note: Before you begin this task, be sure you have completed this prerequisite step, which was highlighted in the prerequisites for this experience: [Install and configure Active Directory-Rights Management Services](#) on DC01.

✓ Begin this step logged on to **DC01** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open **Server Manager**.
2. On the Tools menu, click **Active Directory Rights Management Services**.
3. Navigate to **Server1.contoso.com\Rights Policy Templates**.
4. In the contents pane, click **Create distributed rights policy template**.
5. Click **Add**.
6. In Name, type **Do Not Print**, and then in **Description**, type **Prevent printing**.
7. Click **Next**.
8. Click **Add**, click **Anyone**, and then click **OK**.
9. In **Rights for ANYONE**, check the following rights.

Export (Save As)

Reply

Reply-All

Forward

Note: Some rights will automatically include other prerequisite rights.

10. Click **Next** until you reach the end of the wizard, and then click **Finish**.
11. Click **Add**.
12. Close **Active Directory Rights Management Services**.

Include RMS in file classification

Modify the file classification process to include the Do Not Print RMS template when files contain PII.

✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Switch to **File Server Resource Manager**.
2. Click **File Management Tasks**.
3. In the Actions pane, click **Create File Management Task**.
4. In Task name, type **Apply RMS Policy for PII**.
5. On the Scope tab, click Add, select **C:\Shares\CorpData**, and then click **OK**.
6. On the **Action** tab, in **Type**, select **RMS Encryption**.
7. In **Select a template**, click **Do Not Print**.
8. On the **Condition** tab, click **Add**.
9. Configure the condition [**Personally Identifiable Information**] [**Equal**] [**High**], and then click **OK**.
10. Repeat steps 8 and 9 to add a condition for **PII equal to Moderate** and **PII equal to Low**.
11. On the **Schedule** tab, check each of the seven **weekdays** check boxes, and then check the **Run continuously on new files** check box.
12. Click **OK**.

Test RMS Auto-Classification

Verify that files with a PII value of Low, Moderate, or High are automatically classified Do Not Print.

- ✓ Begin this step logged on to **Server1** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. In File Server Resource Manager, click **File Management Tasks**.
2. In the Actions pane, click **Run File Management Task Now**.
3. Click **Wait for the task to complete**, and then click **OK**.
4. Switch to **DAClient**, and the log on as **Contoso\BenSmith** using the password **pass@word1** or the credentials for the domain you created.
5. Navigate to **\\Server1\CorpData**.
6. Open **SecureData** using Microsoft Word.

Note: Launching Microsoft Word will configure RMS.

Note: This file will have Do Not Print permissions.

- ✓ **Merge** the checkpoints into the respective virtual machines by deleting the checkpoints made earlier.

Table of
Contents

Capability
Scenarios

Server Essentials for Small Business

Protect data and provide secure remote access



Role:

[Infrastructure admin](#)



Technologies:

[Windows Server 2012 R2 Essentials](#)

[System Center 2012 R2 Configuration Manager](#)



Features enabled in this capability

- Storage Spaces
- Windows Azure Backup
- Remote Web Access

Today's small business owners face daily challenges in running their businesses, and one of the more difficult challenges can include managing an IT infrastructure. However, the primary focus for most business owners is on their core business competencies, not on becoming technology experts. Because investments in technology directly impact the bottom line, there is a constant need to achieve real business benefits and mitigate costs against a backdrop of time pressures and limited technical skills. In addition to this pressure, many small businesses are now looking toward cloud services and what they may offer—which can add even more apprehension in adopting new technology.

Windows Server 2012 R2 Essentials is designed to help small businesses operate at the same technology level as much larger organizations, without the added costs and complexities of managing a complicated IT infrastructure. Windows Server Essentials also provides a high degree of flexibility and choice that enables small businesses to leverage a combination of cloud-based or traditional on-premises applications and services.

There are three primary capability areas Windows Server Essentials that meet many of the most pressing needs of small businesses: 1) helping protect your data, 2) providing secure remote access, and 3) integrating cloud services. In addition, there are two key new deployment options available. The first is the ability to run as a Hyper-V host for the purposes of running Windows Server Essentials as a virtual machine—it is no longer necessary to obtain Hyper-V separately. The second is the implementation of the Windows Server 2012 R2 Essentials feature set as a role in

the Standard and Datacenter editions of Windows Server. You can take a closer look at these new capabilities in the sections that follow.

A cloud-enabled solution for small business

Windows Server Essentials incorporates best-of-breed capabilities to deliver a server environment well suited for the vast majority of small businesses. Windows Server Essentials enables you to:

- **Protect your data.** Windows Server Essentials leverages several new features available in Windows Server 2012 to provide greatly improved data protection capabilities. The new [Storage Spaces](#) feature allows you to aggregate the physical storage capacity of disparate hard drives, dynamically add hard drives, and to create data volumes with specified levels of resilience. Windows Server Essentials can perform complete system backups and bare-metal restores of the server itself as well as the client computers connected to the network—now with support for volumes larger than 2 terabytes. The [Windows Azure Backup service](#) can also be used to protect your Windows Server files and folders in a cloud-based storage service that is managed by Microsoft. Windows Server Essentials also centrally manages and configures the new File History feature of Windows 8 and Windows 8.1 clients, helping users to recover from accidentally deleted or overwritten files without requiring administrator assistance.
- **Provide secure remote access.** Remote Web Access provides a stream-lined, touch-friendly browser experience for accessing applications and data from virtually anywhere you have an Internet connection and using almost any device. Windows Server Essentials also provides an updated Windows Phone application and a new modern application for Windows 8 and Windows 8.1 clients, allowing users to intuitively connect to, search across, and access files and folders on the server. Files are automatically cached for offline access and synchronized when a connection to the server becomes available. Windows Server Essentials turns setting up virtual private networking (VPN) into a painless wizard-driven process of just a few clicks, and simplifies the management of VPN access for users. Client computers can leverage a VPN connection to remotely join the Windows Server Essentials environment without the need to come into the office.
- **Integrate cloud services.** Windows Server Essentials has been designed to allow customers the flexibility to choose which applications and services run on-premises and which run in the cloud. In previous versions, Windows Small Business Server Standard included Exchange Server as a component product, which added expense and complexity for customers who wished to leverage cloud-based messaging and collaboration services. With Windows Server Essentials, customers can take advantage of the same type of integrated management experience whether they choose to run an on-premises copy of Exchange Server, subscribe to a hosted Exchange service, or subscribe to Office 365.
- **Monitor health.** Windows Server Essentials monitors its own health status and the status of client computers running Windows 7, Windows 8, Windows 8.1, and Mac OS X version 10.5 and above. Health status notifies you of issues or problems related to computer backups, server storage, low disk space, and more. Health reports can be

automatically generated on a scheduled basis and emailed directly to local administrators or external partners.

- **Provide extensibility.** Windows Server 2012 Essentials builds on the extensibility model of Windows SBS 2011 Essentials, which allows other software vendors to add capabilities and features to the core product, and adds a new set of Web Services APIs. It also maintains compatibility with the existing software development kit (SDK) and add-Ins created for Windows SBS 2011 Essentials.

The Windows Server solution

Technology has always promised to solve problems, not create them. Windows Server 2012 R2 Essentials and the Windows Server Essentials Experience role deliver on that promise by simplifying business technology, providing easier setup, installation, and migration experiences, a simplified management experience, and better network-wide security features for the small business customer. They incorporate the latest Microsoft technologies for management, networking, data storage and backup, security, and document and printer sharing. Windows Server Essentials provides integration capabilities for cloud-based applications and services, allowing small business customers the flexibility to choose the best environment for their line-of-business and collaboration solutions.

Windows Server Essentials allows small businesses to retain core infrastructure and security features on their local networks, and also includes technologies to enable robust integration with cloud-based services. This allows end-users to work in ways that are familiar to them, while at the same time making it easier for small businesses to take advantage of the growing set of offerings available in the cloud through platforms such as Microsoft Office 365 and Windows Azure.

Working with Microsoft Partners is also a great way to reduce complexity for businesses. Windows Server Essentials makes it easier for partners to deliver value to customers through simplified installation, administration and mitigated costs.

In the following experience, you will learn how to manage users, user groups and devices in the network.

Experience: Windows Server Essentials management

In this experience, use the Windows Server Essentials Dashboard to manage users, user groups, and devices in the network:

- Enable the Essentials role.
- Manage users and groups in the dashboard.
- Manage devices in the dashboard.
- Configure health alerts and add-ins.
- Protect data.

Prerequisites

To ensure successful completion of this experience, you must add an additional network adapter to a machine that has an external facing, Internet-capable IP as well as one additional 127GB SCSI VHDX. The following steps will walk you through creating these additional components.

- Be sure to complete the prerequisite setup below.

Reference Links

For additional guidance, see the following TechNet articles:

[Windows Server 2012 R2 Essentials and Windows Server 2012 Essentials](#)

[Getting started with Windows Server 2012 Essentials](#)

[Manage User Accounts in Windows Server 2012 Essentials](#)

Complete the prerequisite setup

✓ Begin this step logged on to **Host2** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open **Hyper-V Manager**.
2. Right-click on **Server3**, and select **Settings**. If the virtual machine is running, shut it down before proceeding.
3. From the Settings menu, select **Add Hardware**. From the list of available hardware to add to your virtual machine, select **Network Adapter** and click **Add**.
4. In the Network Adapter settings dialog for your new adapter, select **Eval-External for your Virtual Switch** and click **OK**.
5. From the Settings menu, select **SCSI Controller**. From the list of available hardware to add to your virtual machine, select **Hard Drive** from the SCSI Controller pane on the right-hand side and click **Add**.
6. In the Hard Drive properties page, select **Virtual hard disk** and click **New**.
7. On the Before you Begin page, click **Next**.
8. On the Choose Disk Format page, select **VHDX** and click **Next**.
9. On the Choose Disk Type page, select **Dynamically Expanding**, and click **Next**.
10. On the Specify Name and Location page, for Name enter **Server3_Disk1** and for location enter **D:\VMs\Server3\Virtual Hard Drives**.
11. On the Configure Disk page, set the size to **127GB** (default value), and click **Next**.
12. On the Completing the New Virtual Hard Disk Wizard page, click **Finish**.
13. Start the **virtual machine**.

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Start the Disk Management console, right-click on **Disk 1** and select **Online**.
2. Select **Disk 1** again, and right-click and select **Initialize**.

3. Once the disk is initialized, right-click on **Disk 1** and create **New simple volume**.
4. Click **Next** on all the prompts, accepting the default values for each window, and **Format** Disk 1 when complete.

Enable the Essentials role

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. From the Server Manager dashboard, select **Add roles and features**.
2. On the Before you Begin page, click **Next**.
3. On the Select Installation type page, select **Role-based or feature-based installation** and click **Next**.
4. On the Select destination server page, select **Server3.contoso.com** and click **Next**.
5. On the Select server roles page, select **Windows Server Essentials Experience**, and click **Next**.
6. On the Add Roles and Features Wizard pop-up, click **Add Features** using the pre-populated defaults.
7. On the Select features page, click **Next**, accepting the pre-populated defaults.
8. On the Windows Server Essentials Experience page, click **Next**.
9. On the Web Server Role (IIS) page, click **Next**.
10. On the Select role services page, click **Next**, accepting the pre-populated defaults.
11. On the Confirm installation selections page, click **Install**.
12. Once installation is complete, return to the Server Manager dashboard, and select **Notifications** from the dashboard menu, and select **Configure Windows Server Essentials**.
13. On the Configure Windows Server Essentials page, click **Configure**.

Note: You may need to wait up to 30 minutes for this step to complete.

14. Reboot the server once configuration is complete.

Manage users and groups in the dashboard

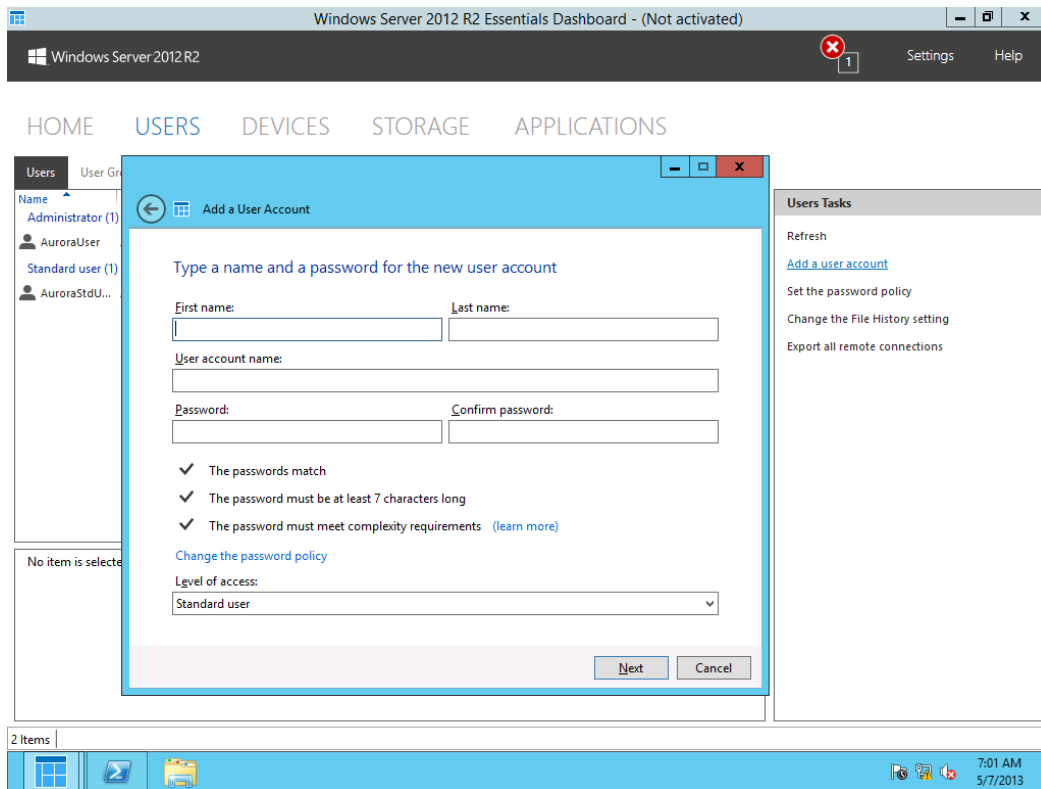
The Windows Server Essentials Dashboard provides an easy way for user and user-group management. In this task, create new user accounts and set the user access permissions. Then create user groups and provide access permissions for the groups.

To create a new user account

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. From the desktop, open the **dashboard**.
2. On the navigation bar, click **Users**.
3. Select the **Users** sub tab.
4. In the Users Tasks pane, click **Add a user account**. The Add a User Account Wizard appears.

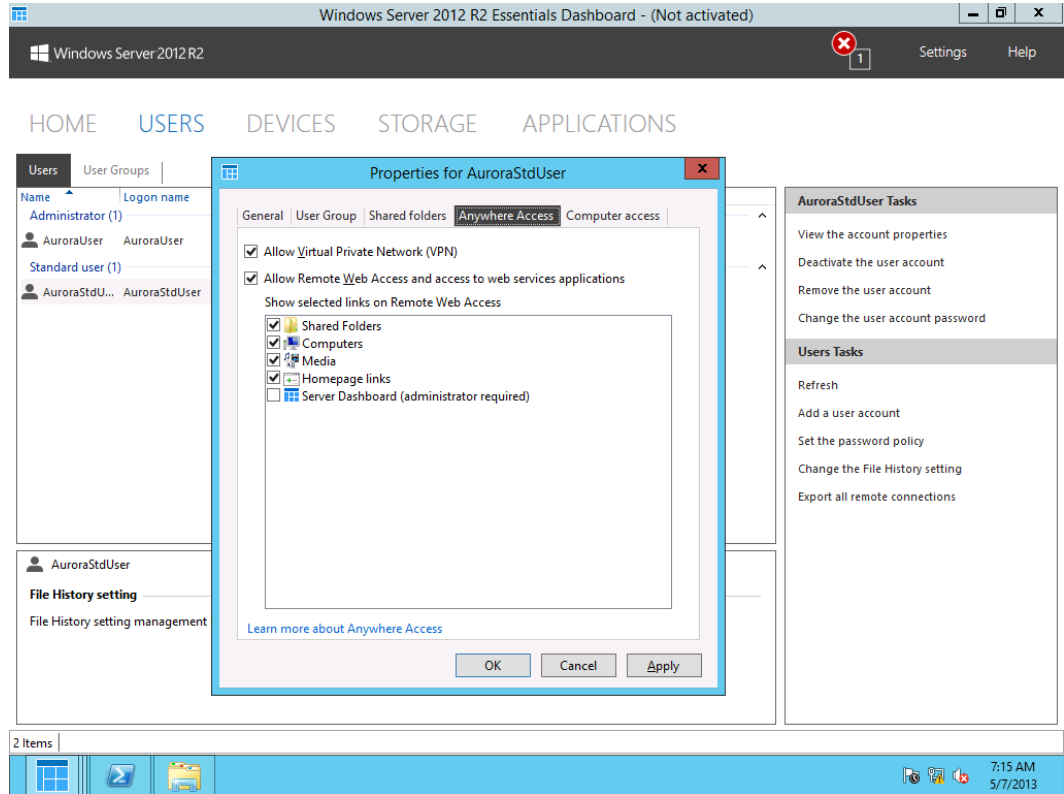
5. Enter the user's First Name as **John** and the Last name as **Smith**. The User Account Name should be **JohnSmith**, and set the password to **PasswOrd!**
6. Set the Level of access to **Standard User**, and click **Next**.



7. On the Select Shared folder access for this user account page, select **read/write** and click **Next**.
8. On the Enable Anywhere Access for this account, check all the check boxes **except** Server Dashboard, and click **Create Account**.

To manage user access permissions

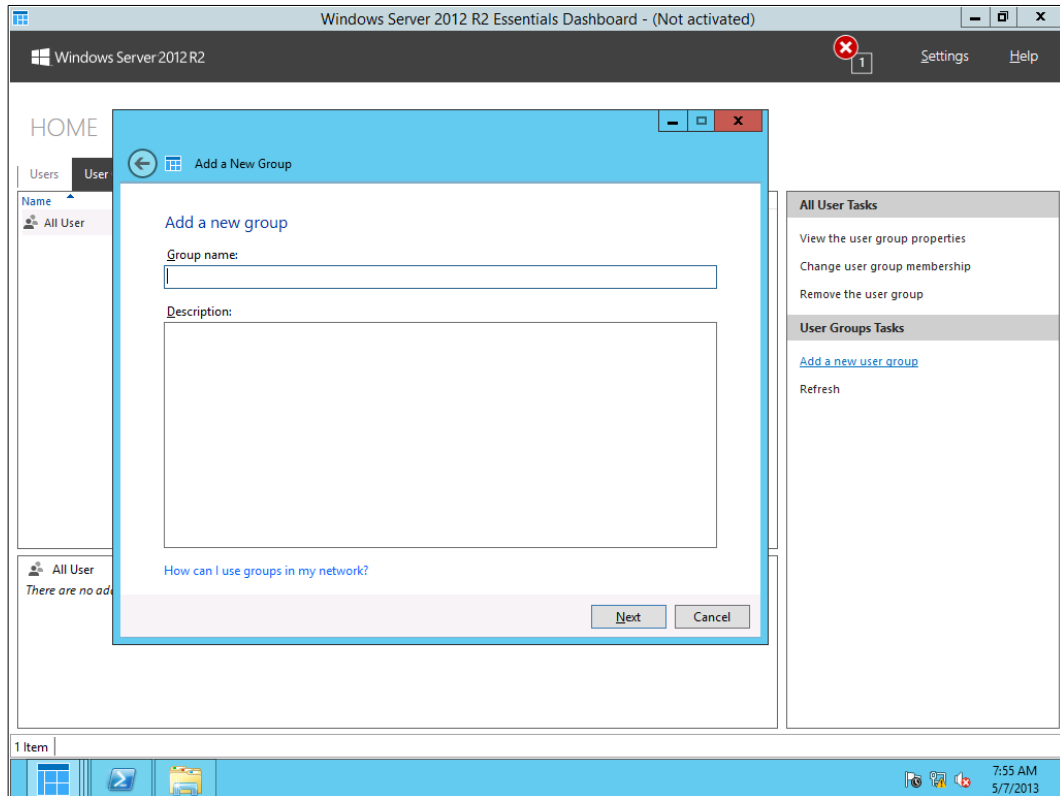
1. Open the Dashboard and on the navigation bar, click **Users**.
2. In the list of user accounts, select the user account to edit.
3. In the User Account Tasks pane, click **View the account properties**.
4. On the Properties for User Account, on the General tab, select **User can view network health alerts** (if the user account needs to access network health reports).
5. On the Shared folders tab, set the appropriate folder permissions for each shared folder as needed.
6. To allow a user to connect to the server using VPN, on the Anywhere Access tab, select the **Allow Virtual Private Network (VPN)** check box.
7. To allow a user to connect to the server using Remote Web Access, on the Anywhere Access tab, select the **Allow Remote Web Access** check box and the **Access to Web Services Applications** check box.
8. On the Computer access tab, select the network computers to which you want to grant the user access.



✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

To create a new user group

1. From the desktop, open the **dashboard**.
2. On the navigation bar, click **Users**.
3. Select the **User Groups** sub tab.
4. In the User Groups Tasks pane, click **Add a user group**. The Add a New Group Wizard appears.
5. Follow the instructions to complete the wizard.

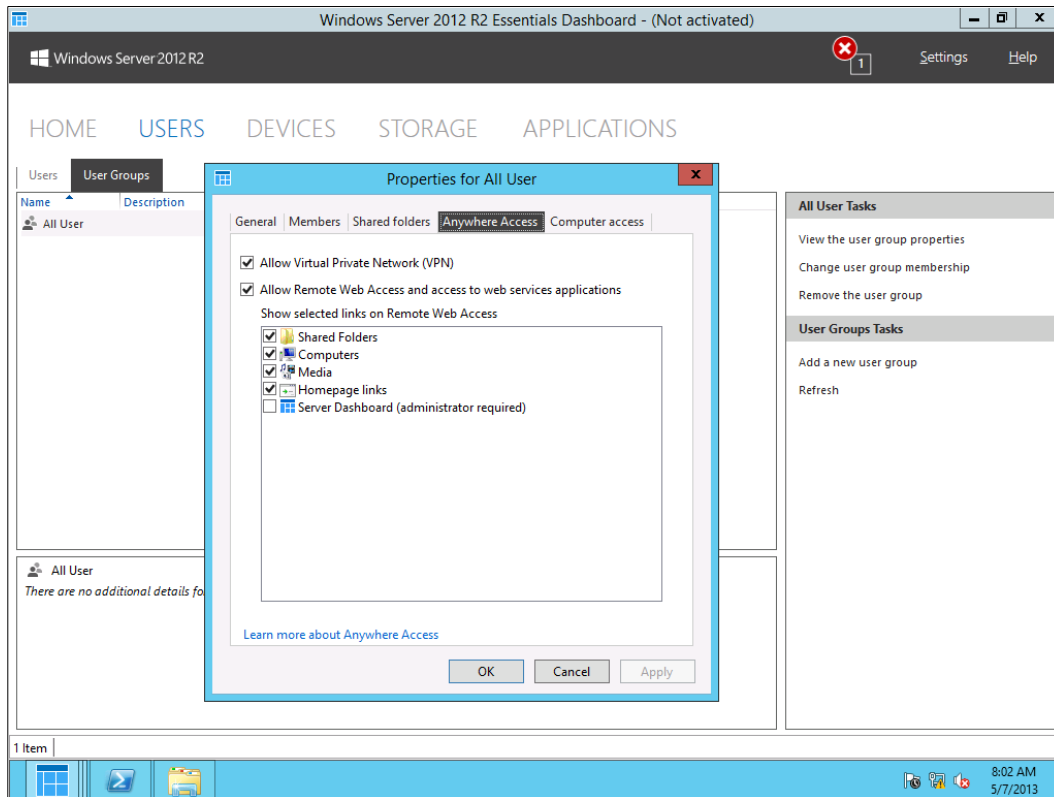


To manage user group access permissions

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open the dashboard. On the navigation bar, click **Users**.
2. Click the **User Groups** sub tab.
3. In the list of user groups, select the user group to edit.
4. In the User Group Tasks pane, click **View the user group properties**.
5. On the Members tab, click **Edit** to select the user accounts that to add to or remove from this user group.
6. In the Shared folders tab, set the appropriate folder permissions for each shared folder as needed.
7. To allow all the users belong to this user group to connect to the server using VPN, on the Anywhere Access tab, select the **Allow Virtual Private Network (VPN)** check box.
8. To allow all the users belonging to this user group to connect to the server using Remote Web Access, select the **Allow Remote Web Access** and **Access to Web Services Applications** check box.
9. On the Computer access tab, select the network computers to which you want to grant group access.

Note: When you change access permissions for a user group and select the User Account for this user group on the Users tab, you should see the updated access level.



Manage computers in the dashboard

In the Windows Server Essentials Dashboard, you can view client computer status and configure group policy settings for network joined computers.

The Devices page of the dashboard displays the following:

- A list of network computers with these details:
 - The name of the computer.
 - The status of the computer: Online, or Offline.
 - The computer description.
 - The Backup status of the computer.
 - The Update status of the computer.
 - The Security status of the computer.
 - The Alerts status of the computer.
 - Group Policy information for the computer.
- A details pane with additional information about a selected computer.
- A tasks pane with a set of device administrative tasks.

To view the status of network computers

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open the **dashboard**.
2. On the navigation bar, click **Devices**.
3. View status of all the computers in the network within the list pane.

Note: Currently only Server3 is managed by the Essentials role.

The screenshot shows the Windows Server 2012 R2 Essentials Dashboard. The navigation bar includes HOME, USERS, DEVICES, STORAGE, and APPLICATIONS. The DEVICES tab is active, displaying a table of network computers and servers.

Name	Status	Description	Backup status	Update status	Security status	Alerts	Group Policy
Computers (1)							
SMALLOFFICEPCW8	Online	Windows 8 Cl...	Successful	Warning	In compliance	Warning	Not Applicable
Servers (1)							
SOEssential(Pri...	Online	My business s...	Not set up	Up to date	Not Applicable	Critical	Not Applicable

Below the table, the details for the selected computer (SMALLOFFICEPCW8) are shown:

General information about this computer

- Operating System: Windows 8 Enterprise
- System type: 64-bit Operating System
- Update: 1 important update is available, but is not yet installed.
- Security: The computer complies with all security requirements.

The sidebar on the right contains tasks for SMALLOFFICEPCW8 and Computers Tasks.

SMALLOFFICEPCW8 Tasks

- View the computer properties
- Start a backup for the computer
- Restore files or folders for the computer
- Customize Backup for the computer
- Remote Desktop to the computer
- Remove the computer

Computers Tasks

- Client computer backup tasks
- How do I connect computers to the server?
- Implement Group Policy

At the bottom, there is an "Activate Windows" notification: "Go to Action Center to activate Windows."

Configure health alerts and add-ins

In this step, you will configure health alerts and add-ins.

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open the **dashboard** and then click the **Devices** tab.

Note: All computer management is performed on the Devices tab. Here you can view details of each computer joined to the network, including Mac client computers. There are a number of alerts you can review in the lab environment.

2. Click **Server3**, and then in the Tasks pane, click **View the server properties**, and then click the **General** tab.
3. On the General tab, review the computer information, and then click the **Backup** tab.

Important

Depending on the elapsed time and the time of day, you may not see any backups in the Server3 Properties dialog box, as the first automatic backup will take some time to complete.

4. Select the first backup (if present), and then click **View Details**.

Note: You can view the computer's backup history, when the backups ran, whether they were successful, and how many are currently stored on the server. The automated client backup in Windows Server Essentials allows you to restore individual files and folders, and even perform a complete bare-metal restore if needed. If one of the employee's machines had a catastrophic failure, it can easily be restored using either a Recovery DVD or USB key.

Note: For Windows 8 clients, there is an additional option to be able to manage the File History settings.

5. Review the backup details (If present), and then click **OK** twice to return to the Devices page.

Note: By examining one of the latest backups you can see which volumes are backed up and manage the lifecycle of this backup if required. By default, a backup retention policy controls how long backups are kept.

Protect data

A key requirement for organizations of any size is the ability to protect data. Windows Server 2012 R2

Essentials helps Contoso avoid data loss and prolonged downtime due to hard drive crashes or system failures for server and client computers. Although Windows Server Essentials has automated client backups, the default schedule is between 6 P.M. and 9 A.M. While this is sufficient for computers on the network; Richard wants to have a backup of Server3 immediately.

Windows Server Essentials leverages checkpoint backup technology, which allows fast, efficient backups. By default, the server is backed up twice a day, but you can define a custom schedule to meet the needs of your business. The first backup will capture all the data and system files, while subsequent backups will only capture the changes and will be much faster.

In this step, you will start a backup so that you know Server3 is fully protected.

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open the dashboard, and in Devices, select **Server3**, and then in the Server3 Tasks pane, click **Set a backup for the server**.
2. In the **Backup Description for Server3**, keep the default name, and then click OK.

Note: The backup can be named so that it can be easily identified.

3. Review the content of the Getting Started page, and then click Next.

Note: To implement server backup, you need to specify three things: a backup destination disk (which can be internal, but external drives are recommended), the items you wish to back up, and the schedule you want to use

4. Check **Show all drives that can be used as backup drives**, check the **Microsoft Virtual Disk Drive#1** check box, and then click **Next**.

Note: Because this is the first time the backup has been configured, you will need to specify the backup destination drive. When selecting a backup destination drive for the first time, you will be prompted to format the drive.

5. In the Set up Server Backup dialog box, click **Yes**.
6. In Microsoft Virtual Disk Drive #1, type **Primary Server Backup**, and then click **Next**.

Note: It is very helpful to provide a label for your backup destination and to affix a matching label to the physical device. That way, you can easily identify the desired device when performing subsequent backups or restoring data.

7. Click **Next**, then **Next** again.

Note: You can specify which items you want to protect. In most cases, all items will be selected.

8. Click **Apply settings**.
9. Click **Close**.

The server backup setup is completed, and now provides daily automated backup of both the client computers and the server.

Client backup is only part of the story. For a full disaster recovery solution you also need server backup. Windows Server Essentials provides full automated server backup for the OS, system files, shared folders, as well as the client computer backups. This ensures that you can fully recover if anything happens to the server.

Two advanced experiences are available in [Appendix: Advanced Windows Server Experiences](#), if you want to explore further.

- Configure Group Policy settings for network-joined computers.
- Health monitoring and reporting.

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Windows Server and the Datacenter

On the pages in this guide, you have seen how Contoso resolves both common and unique business challenges with Windows Server 2012 R2 features and capabilities. Perhaps you have had an opportunity to step through some of the experiences in your evaluation environment.

As you have seen, Windows Server 2012 R2 can help you automate a broad set of management tasks, simplifying the deployment of major workloads and increasing operational efficiencies. You benefit from new levels of cross-platform support, as well as resilient, multi-tenant-aware storage, and networking capabilities that handle a wide range of workloads using industry-standard hardware. Together with Windows Azure and System Center 2012 R2, you get a datacenter solution with support for modern, self-service applications, automation of repeatable tasks, and the ability to more efficiently manage datacenter capacity, helping increase business agility.

For more information, see the videos and other resources in the [Appendix: Windows Server Resources](#). To understand and evaluate how System Center 2012 R2 adds a management layer to enable at-scale management of major new Windows Server capabilities, including storage, networking and server virtualization innovations, download the [System Center 2012 R2 Evaluation Guide](#). As with this guide, you can use the guide to build a System Center evaluation environment and walk through some experiences.

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Appendix: Advanced Windows Server Experiences

Server Essentials for Small Business

Two advanced experiences follow:

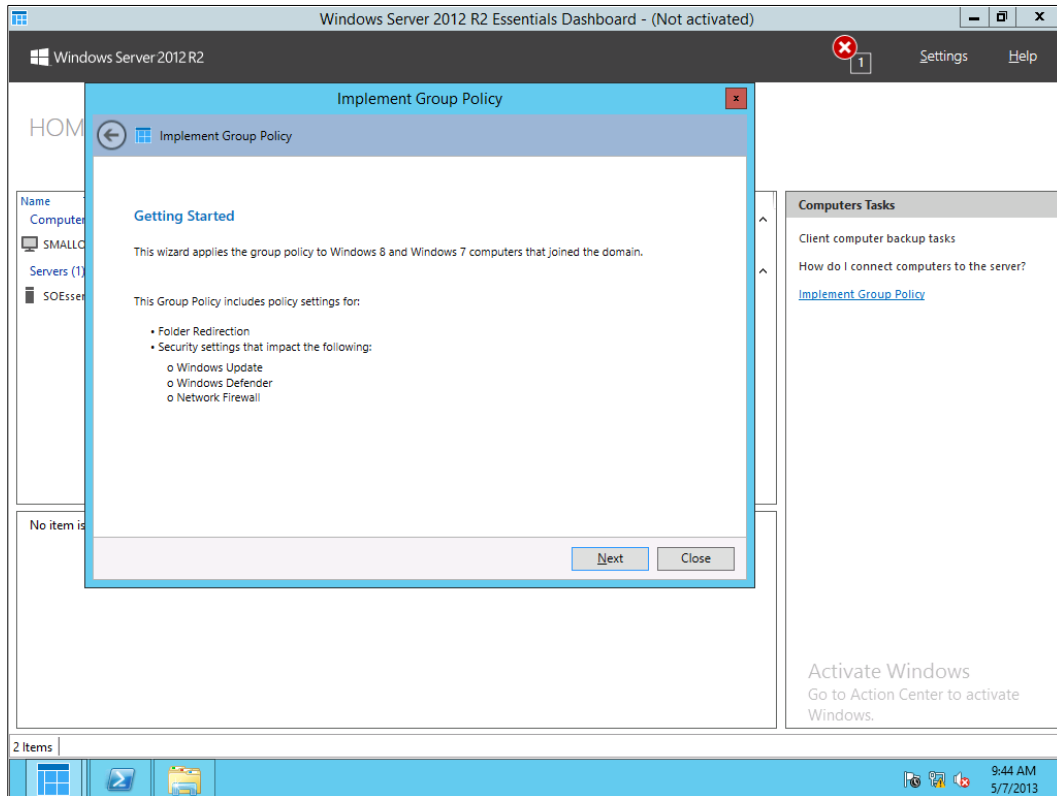
- Configure Group Policy settings for network-joined computers.
- Health monitoring and reporting.

Configure Group Policy settings for network joined computers

You can configure Group Policy settings and deploy them to computers in the Windows Server 2012 R2 Essentials network using the Dashboard. The Windows Server Essentials Group Policy includes settings for Folder Redirection, Group Policy, and Security Policy Settings that impact Windows Update, Windows Defender, and the Network Firewall.

To configure Group Policy in Windows Server Essentials

- ✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.
1. Open the **Dashboard**.
 2. On the navigation bar, click **Devices**.
 3. In the global **Devices Tasks** pane, click **Implement Group Policy**. The **Implement Group Policy** wizard appears.
 4. On the **Enable Folder Redirection Group Policy** page of the wizard, you can choose **User Folders** to be redirected.
 5. On the **Enable Security Policy Settings** page of the wizard, you can choose to select **Group Policy for Windows Update, Windows Defender, and the Network Firewall**.
 6. Click **Finish** to implement the Group Policy.



Health monitoring and reporting

In this step, learn about the Windows Server Essentials health status monitoring and reporting. You will open the Health Monitoring tab, manage Health alerts, and set up the Health report.

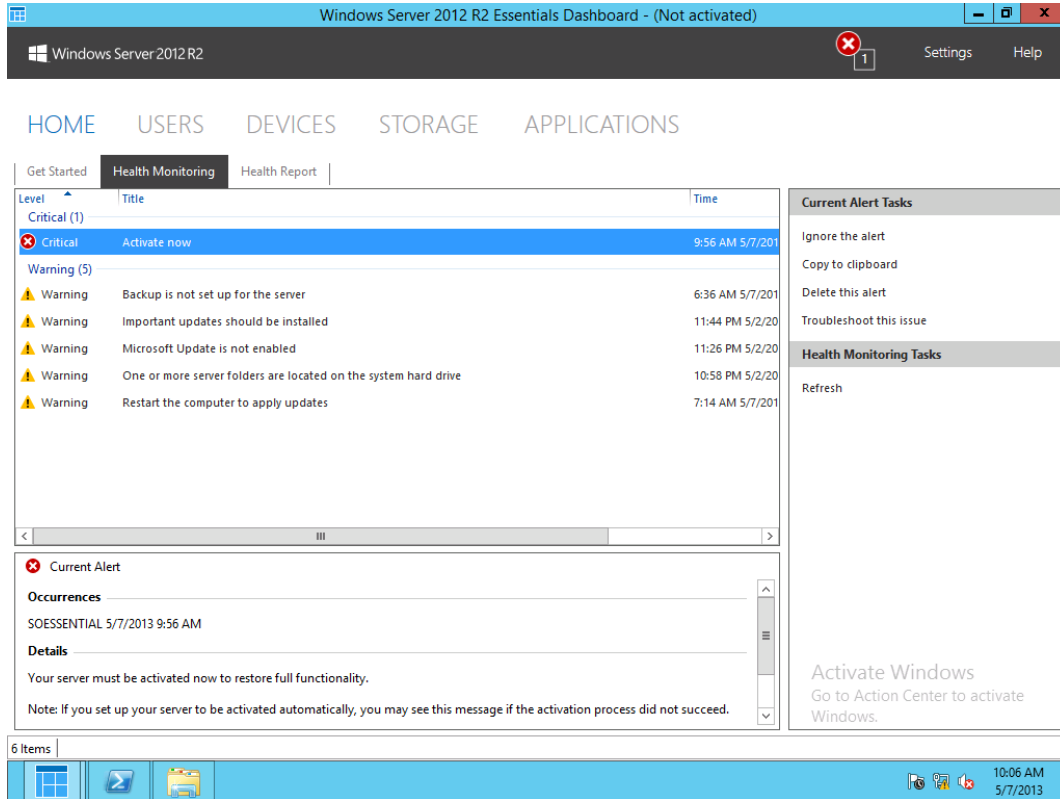
Open Health Monitoring tab

The server monitors its health status and the health of computers that are connected to it. It generates an alert for issues that are related to computer backups, server storage, files system, hard drives, and more. These issues are displayed as alerts in the Health Monitoring tab in the Dashboard.

To view the Health Monitoring tab

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open the **Dashboard**.
2. On the menu bar, click any of the displayed alerts icons (Critical, Warning, or Informational) and then click **See more information**.
3. You can also click **HOME** on the navigation bar and then click the **Health Monitoring** tab to go there directly.



Managing health alerts

This task presents organizing, resolving, ignoring, and deleting alerts in the Dashboard.

Organizing alerts

You can organize alerts in the Health Monitoring tab and display them based on their severity level (Critical, Warning, or Informational) or based on the computer name.

To organize health alerts

✓ Begin this step logged on to **Server3** as Contoso\Administrator using the password **pass@word1** or the credentials for the domain you created.

1. Open the **Dashboard**.
2. Click the **Health Monitoring** tab.
3. Right-click the empty space below the alerts and then do one of the following:
 - a. Select **Group by Computer**. This displays alerts grouped by computer name.
 - b. Select **Group by Level**. This displays alerts grouped by severity level.

To delete health alerts

1. Open the **Dashboard**.
2. Click the **Health Monitoring** tab.

3. Right-click the alert that you want to delete, and then click **Delete**.

The deleted alert is removed immediately. If you delete an alert and the server detects the problem again in the health evaluation cycle, it generates a new alert. You can instantly refresh the alerts list by clicking **Refresh**.

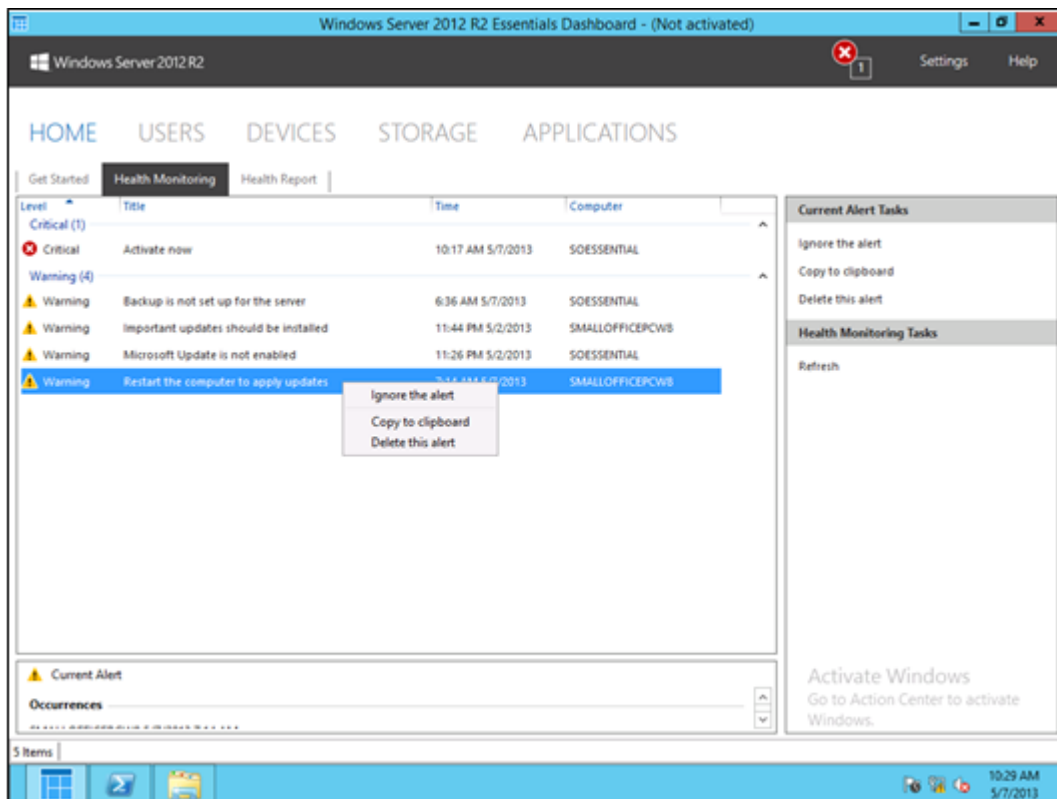
To ignore health alerts

1. Open the **dashboard**.
2. Click the **Health Monitoring** tab.
3. Select the alert that you want to ignore, and then in the Tasks section, click **Ignore the alert**.

You can ignore an alert if you prefer to respond to it later. When you ignore an alert, it is still listed in the Health Monitoring tab, but it is in an inactive state.

Note: An ignored alert is not included in the overall health assessment of the computers in the network.

You can activate the alert again if you would like to include it in the next network health assessment cycle.



To activate health alerts

1. Open the **Dashboard**.
2. Click the **Health Monitoring** tab.
3. Select the alert that you want to activate, and then in the Tasks section, click **Activate this alert**.

When you activate an alert that you have ignored, it becomes active, and it is included in the overall health assessment of the computers in the network.

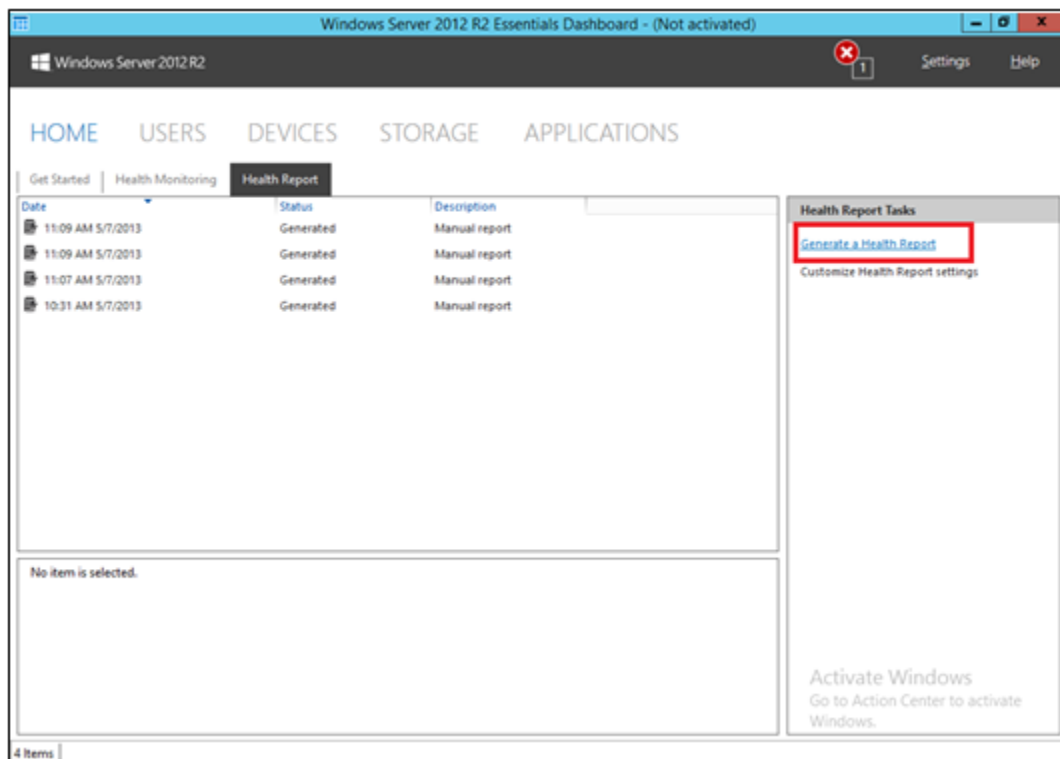
Health report

You can configure your server to notify you of alerts by email. The email alert notifications contain the same information about the network issues and resolution steps that is displayed in the Health Monitoring tab. In this task, find out how to generate a report on demand or on schedule, customize Health report settings and configure SMTP on your server to send Health report email.

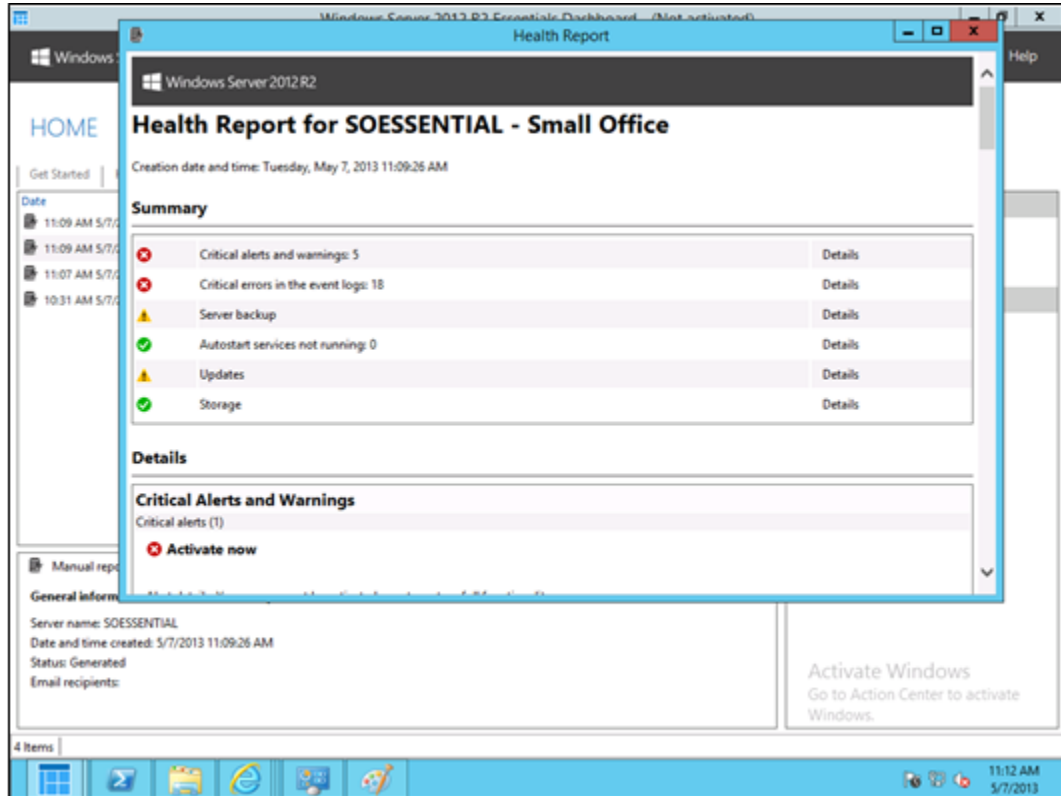
Generate a report on demand or on schedule

✓ Begin this step logged on to **Server3** as **Contoso\Administrator** using the password **pass@word1** or the credentials for the domain you created.

1. Open the Dashboard and on the navigation bar, click **HOME**.
2. Click the **Health Report** tab.
3. In the Health Report Tasks pane, click **Generate a health report**. After a health report is generated, a new item is created in the list pane, identified by the date and time the report was generated.



4. To open a report, you can double-click it in the list pane, or you can select it and then click **Open the health report** in the task pane. The report will be displayed in a new window in HTML format.



Customize Health Report settings

1. Open the **Dashboard** and on the navigation bar, click **HOME**.
2. Click the **Health Report** tab.
3. In the Health Report Tasks pane, click **Customize Health Report settings**.
4. On the **Content** tab, select or clear the check boxes for the content that you want to see in the report.
5. On the **Schedule and Email** tab, set the health reporting schedule time.

Configure SMTP on your server to send Health Report email

To set up email for health reporting

1. Open the **Dashboard** and on the navigation pane, click **HOME**.
2. Click **Health Report** tab.
3. In the Health Report Tasks pane, click **Customize Health Report settings**.
4. Click the **Schedule and Email** tab, and then click **Enable**.
5. In the SMTP Settings window, do the following:
 - a. In the **From** text box, type an email address from which the email alerts will be sent. This email address will be displayed as the sender's address in the alert notification email.
 - b. For SMTP server name, type the name of the SMTP server corresponding to the email typed in step 5a. See **Figure 4** for a list of some SMTP server names.
 - c. For SMTP port, type the port number that is used by the SMTP server to send and

receive email. (Refer to **Figure 4** for the port numbers that are used by the some of the SMTP servers).

- d. Select **This server requires a secure connection (SSL)** if the SMTP server uses SSL. See **Figure 4**.
- e. Select **This server requires authentication** if the SMTP server requires a user name and password information (see **Figure 4**). If you select this check box, type the user name and password of the email address that you entered in the From email address field in step 5a, and then click **OK**.

SMTP Server	SSL Require	Authentication	Port Number	Account Name/Login Name
smtp.gmail.com	Yes	Yes	587	Provide full email address with domain name and password for
smtp.live.com	Yes	Yes	587	Provide full email address with domain name and password for
smtp.comcast.net	Yes	No	587	Provide full email address with domain name and password for
smtp.mail.yahoo.com	No	Yes	25	Provide only the email address without a domain name for the user

Figure 4: Examples of SMTP server settings

- 6. In **Set up notification for alerts**, for Email recipients, type the email addresses of the persons that you would like to receive reports by email. Separate each email address with a semicolon (;).
- 7. To verify that you have configured your SMTP server settings correctly to send email notifications for alerts, click **Apply**, choose one health report, and then click **Email the Health Alert**.

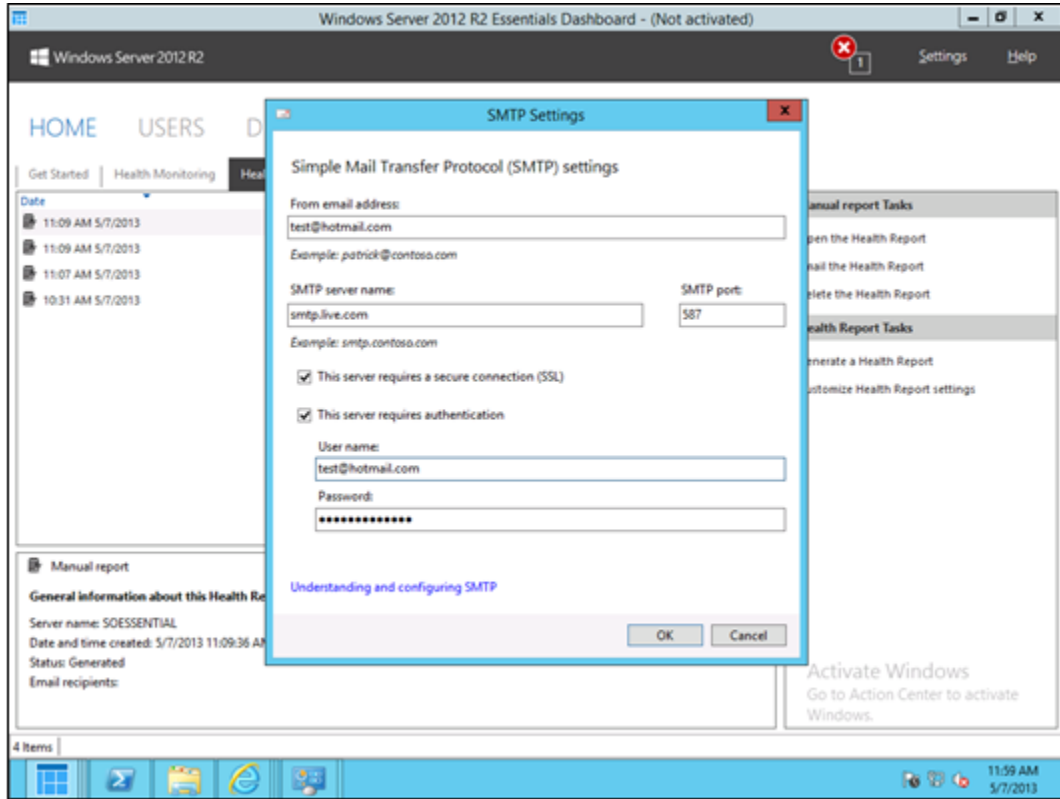


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Appendix: Windows Server Resources

References for IT Professionals

Take a look at tools especially for IT pros, including videos, podcasts, and educational sessions.

Posters and Guides	
Windows Server Architecture	Find posters and companion reference guides for key Hyper-V technologies in Windows Server 2012.

Video and audio resources	Details
TechNet Radio	The podcast for anyone who is passionate about IT. Weekly guests include IT peers and technical roles inside Microsoft and industry experts.
TechNet Video	Videos, screencasts, podcasts, and articles to help IT pros stay up to date on the latest Microsoft products and technologies
The Edge Show (formerly TechNet Edge)	Weekly news from Microsoft relevant for IT pros and a technical dive into various products and scenarios like Windows Server, Windows Azure, Private Cloud, and
TechEd 2013 Keynote Presentation	With Brad Anderson, Microsoft
TechEd 2013 Foundation Session: Transform the Datacenter with Server and Management Innovations from Microsoft	With Jeffrey Snover and Jeff Woolsey, Microsoft
TechEd 2013 Foundation Session: Big Data. Small Data. Any Data	With Shawn Bice, Microsoft
TechEd 2013 Foundation Session: Enabling People-Centric IT	With Andrew Conway, Microsoft
TechEd 2013 Foundation Session – Building Modern Business Applications	With Scott Woodgate, Microsoft

MMS 2013 Keynote – Cloud Optimize your Business with Microsoft Management Solutions	With Brad Anderson, Microsoft
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Event Resources
TechEd North America 2013, New Orleans, June 3-June 6
Build 2013, San Francisco, June 26-June 28
TechEd Europe 2013, Madrid, June 25-June 28
Microsoft Management Summit 2013, Las Vegas, April 8-April 12

Education
Microsoft Virtual Academy Courses – Windows Server
Microsoft Virtual Academy Courses – Windows Azure
Microsoft Virtual Academy Courses – SQL Server
Microsoft Learning – Private Cloud training
Microsoft Learning – Windows Server training
Microsoft Learning – SQL Server training
Microsoft Learning – Windows Azure training
Microsoft Jump Start series

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