Virtualized Microsoft SharePoint Server 2013 on Dell PowerEdge FX2s

Deployment Guide

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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Abbreviations

Table 1. Abbreviations

Abbreviations	Definition
bNDC	blade Network Daughter Card
CLI	command-line interface
CMC	Chassis Management Controller
CPLD	complex programmable logic device
Dell RACADM	Dell Remote Access Controller Admin
DCB	Data Centre Bridging
EULA	End User License Agreement
FCOE	Fibre Channel over Ethernet
FC	Fibre Channel
HBA	Host Bus Adapter
iDRAC8	integrated Dell Remote Access Controller
IOA	I/O aggregator
LUN	logical unit number
NPAR	NIC Partitioning
OOB Network	Out-of-band Network
SAN	Storage Area Network
SNMP	Simple Network Management Protocol
VLT	Virtual Link Trunking
VLTi	VLT interconnect

Abbreviations	Definition
VM	virtual machine
VMM	Virtual Machine Manager
WWN	World Wide Name

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Overview

This guide provides the guidelines to implement virtualized Microsoft SharePoint Server 2013 SP1 on the Dell PowerEdge FX2s chassis, as specified in the *Reference Architecture - Microsoft SharePoint Server 2013 on Dell PowerEdge FX* . The guide covers the hardware and software requirements to implement up to 5000 users on the Dell PowerEdge FX2s with Hyper-V.

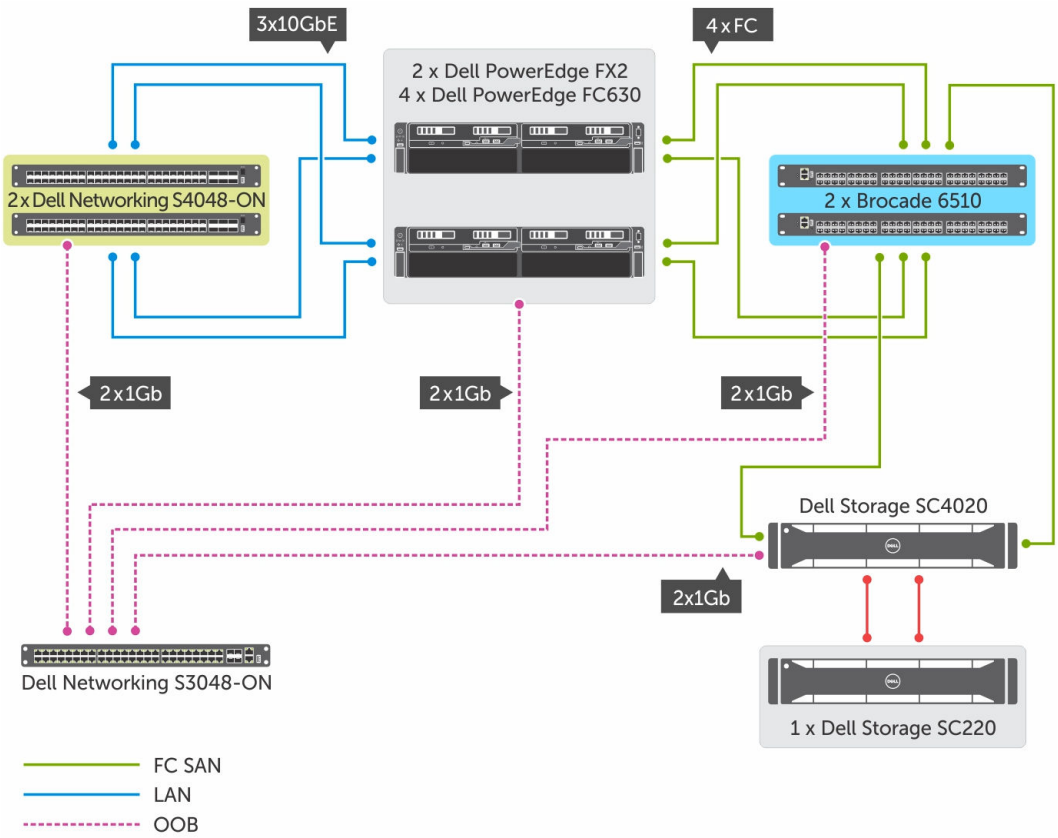

Figure 1. Virtual machine and SharePoint data store

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Solution requirements

The following are the hardware and software requirements for deploying virtualized Microsoft SharePoint Server 2013 SP1 on the Dell PowerEdge FX2s chassis.

Hardware requirements

The following table lists the hardware requirements.

Table 2. Hardware requirements

Components	Hardware Requirements	
Virtualization infrastructure	2 x Dell PowerEdge FX2s 8 x Qlogic QLE 2652 DP PCIe Add-on FC HBA (4 per PowerEdge FX2s) 4 x Dell Networking FN410S blade IO aggregators (IOA) (2 per PowerEdge FX2s)	
Virtualization hosts	4 x Dell PowerEdge FC630 Servers (2 per PowerEdge FX2s)	
	Processor	2 x Intel Xeon E5-2660 v3 family
	Memory	128GB, 8 x 16GB DDR4 DIMMs
	HDD	2 x 600GB 10K SAS in RAID 1 for OS volume
	Network	QLogic BCM57840S
	OS	Windows Server 2012 R2 Datacenter edition
Storage arrays	Dell Storage SC4020 with a Dell Storage SC220 expansion attached	
Networking	2 x Dell Networking S4048-ON for local area networking (LAN) 2 x Brocade 6510 FC switches for FC storage area networking (SAN)	

Software requirements

The following table lists the software requirements for the SharePoint farm VMs:

Table 3. Software requirements

Components	Software requirements	
SharePoint front-end servers	OS	Windows Server 2012 R2 Datacenter edition
	SharePoint	SharePoint Server 2013 SP1 Standard edition

Components	Software requirements	
SharePoint application servers	OS	Windows Server 2012 R2 Datacenter edition
	SharePoint	SharePoint Server 2013 SP1 Standard edition
SharePoint database servers	OS	Windows Server 2012 R2 Datacenter edition
	SQL	SQL Server 2014 Enterprise edition

End to end IO connectivity

According to the application best practices and infrastructure design principles, each application network is deployed as a separate workload VLAN that is defined in the data center core network. All the workload VLANs are created as virtual network adapters on the converged virtual switch across four network connections. The Qlogic QLE2562 FC adapters are used for FC connectivity in the host operating system and virtual FC adapters are used for the VMs that require in-guest FC connectivity.

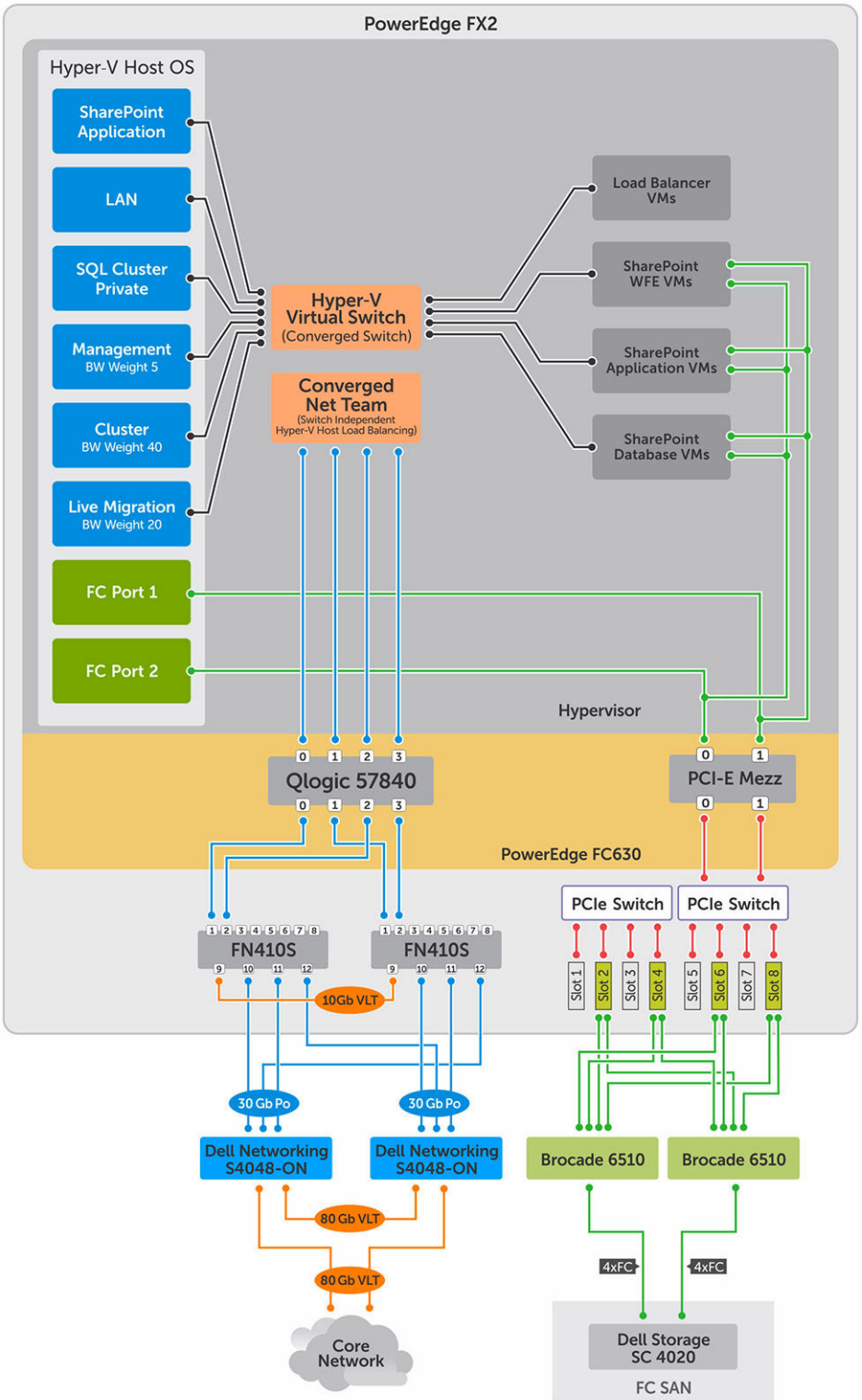

Figure 2. IO connectivity

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Microsoft SharePoint Server 2013 SP1 on the Dell PowerEdge FX2s — deployment workflow

This section outlines the complete deployment sequence of virtualized Microsoft SharePoint Server 2013 SP1 on the Dell PowerEdge FX2s solution.

1. Complete the solution requirements. See Solution requirements.
2. Follow the instructions in the *Microsoft Windows Server 2012 R2 - Hyper-V on Dell PowerEdge FX2s Deployment Guide* to build virtual infrastructure solution for deploying Windows Server 2012 R2 Hyper-V on the Dell PowerEdge FX2s chassis. See http://en.community.dell.com/techcenter/extras/m/white_papers/20441315.
3. Prepare VMs for SharePoint. See Preparing virtual machines for SharePoint.
4. Install Windows Server 2012 R2 operating system. See Installing Windows Server 2012 R2 operating system in the virtual machine.
5. Configure the SharePoint 2013 database server. See Configuring the SharePoint database servers.
6. Install SharePoint prerequisite files. See Configuring prerequisites to install SharePoint 2013 SP1.
7. Install SharePoint Server. See Installing SharePoint Server 2013 SP1.
8. Configure the SharePoint Server. See Configuring SharePoint Server 2013 SP1.

Preparing virtual machines for SharePoint

This section details the network and storage specifications along with their configuration for preparing the VMs. Additionally, the section provides the Windows PowerShell scripts to create Web Front End (WFE), application , and database virtual machines for SharePoint farm deployment.

Network specifications

To isolate the network traffic, four different LAN network connections are created and assigned with different VLANs on the host machine.

NOTE: The VLAN IDs used in the deployment guide represents the implementation of SharePoint farm infrastructure as mentioned in the following table. The VLAN IDs can be customized based on your existing environment.

The following table lists the network specifications for the virtual machines:

Table 4. LAN and SAN specifications

Network	LAN	VLAN	SAN
SharePoint front-end servers	1 x network adapters for management	25	2 x Virtual FC adapters for FC connectivity
	1 x Application	26	
	1 x public connectivity	27	
SharePoint application servers	1 x network adapters for management	25	2 x Virtual FC adapters for FC connectivity
	1 x Application	26	
SharePoint database servers	1 x network adapters for management	25	2 x Virtual FC adapters for FC connectivity
	1 x Application	26	
	1 x SQL cluster private connectivity	28	

This environment uses Fibre Channel (FC) virtual adapter to map the storage volumes directly to the SharePoint application and database servers for better performance.

Run Windows PowerShell command to configure the virtual SAN switches for each FC adapter in the host server.

Configuring Brocade 6510 SAN switch

Microsoft Windows Server 2012 R2 allows direct access to FC shared storage through multiple guest virtual machines. Combined with the Brocade FC switch and SAN infrastructure, this new capability simplifies connectivity between FC SAN storage and Hyper-V applications.

The zoning must be performed with virtual WWPN ports and the virtual storage ports on each of the Brocade 6510 switch.

For more information on configuring Brocade 6510 switch, see the section *Configuring Brocade 6510 fibre channel switches* in the *Microsoft Windows Server 2012 R2 - Hyper-V on Dell PowerEdge FX2s Deployment Guide*, which is available at, http://en.community.dell.com/techcenter/extras/m/white_papers/20441315.

Storage specifications

For ease of management and better application performance, four content databases are created to store four site collections. Each of the data and log files of the content databases are stored in respective storage volumes. The following table lists the storage specifications for the Hyper-V cluster and the SharePoint environment.

Table 5. Storage specifications

Servers	Number of volumes	Size of each volume
Hyper-V cluster		
Clustered shared volume for hosting VMs	1	1 TB
SharePoint database servers		
Content database	4	650 GB
Content database logs	4	100 GB
Search database	1	200 GB
Usage Database	1	200 GB
Temp DB	6	50 GB
Other SharePoint Databases (SharePoint Configuration and Admin Content)	1	100 GB
Quorum volume	1	1 GB
SharePoint application server		
Application servers	1 volume per server	200 GB
SharePoint web server		
WFE servers	1 volume per server	200 GB

For more information on creating and mapping the storage specification, see the section *Configuring Dell Storage SC4020* section in the *Microsoft Windows Server 2012 R2 - Hyper-V on Dell PowerEdge FX2s Deployment Guide* , which is available at, http://en.community.dell.com/techcenter/extras/m/white_papers/20441315.

Configuring the virtual machines

The following table summarizes the number of virtual machines required for deploying the SharePoint infrastructure.

Table 6. Summary of the SharePoint farm VMs

Application Role	Number of VMs
SharePoint Web front-end	2
SharePoint application Server	2
SQL for SharePoint databases	2
Virtual Load balancer appliances	2

The following sections provide details about the WFE, APP, DB virtual machine specifications and the respective Windows PowerShell scripts for creating the virtual machines.

Configuring WFE virtual machines

About this task

This section lists the WFE virtual machine specifications and provides the steps to create WFE VMs.

Table 7. SharePoint front-end server specifications

Component	Details	
SharePoint front-end servers	2 x Hyper-V virtual machines	
	Processor	4 x virtual processors
	Memory	16GB
	OS VHDX	1 x 160GB stored on the VM store array
	Data volumes	1 x 200GB volume per VM
	Network	3 x network adapters for management, SQL application and public connectivity

Perform the following steps to create the WFE1 virtual machine for the specifications mentioned in the table:

Steps

1. Create fixed VHD for better IO performance.

```
$VHDPath="C:\ClusteredStorage\volume1\HDD\WFE1.vhdx"
New-VHD -SizeBytes 160GB  -Path $VHDPath -Fixed
```

2. Create a WFE1 virtual machine.

```
$VMPath="C:\ClusteredStorage\volume1\VMs\WFE1"
New-VM -Name SP -Path $VMPath -MemoryStartupBytes 16GB -BootDevice CD -
SwitchName Management -VHDPath $VHDPath
```

3. Configure the WFE1 virtual machine.

```
Set-VMProcessor -VMName WFE1 -Count 4
Add-VMNetworkAdapter -VMName WFE1-Name Application
Add-VMNetworkAdapter -VMName WFE1-Name LAN
Connect-VMNetworkAdapter -VMName WFE1 -Name Application -SwitchName
Application
Connect-VMNetworkAdapter -VMName WFE1 -Name Application -SwitchName LAN
Set-VMNetworkAdapterVlan -VMName WFE1 -VMNetworkAdapterName Management -
Access -VlanId 25
Set-VMNetworkAdapterVlan -VMName WFE1 -VMNetworkAdapterName Application -
Access -VlanId 26
Set-VMNetworkAdapterVlan -VMName WFE1 -VMNetworkAdapterName LAN -Access -
VlanId 27
```

4. Add SAN switch to a WFE1 virtual machine.

```
Add-VMFibreChannelHba –VMName WFE1 –SanName SANSWITCH1
Add-VMFibreChannelHba –VMName WFE1 –SanName SANSWITCH2
```

5. Repeat steps 1 through 4 to create WFE2 virtual machine by changing the name to WFE2.

Next steps

Next, configure the SharePoint application virtual machines after configuring the WFE virtual machines.

Configuring APP virtual machines

About this task

This section lists the APP virtual machine specifications and provides the steps to create APP VMs.

Table 8. SharePoint application server specifications

Component	Details	
SharePoint application servers	2 x Hyper-V virtual machines	
	Processor	4 x virtual processors
	Memory	8GB
	OS VHDX	1 x 160GB stored on the VM store array
	Data volumes	1 x 200GB volume per VM
	Network	3 x network adapters for management, SQL application and public connectivity

Perform the following steps to create APP1 virtual machine for the specifications mentioned in the table:

Steps

1. Create fixed VHD for better IO performance.

```
$VHDPath="C:\ClusteredStorage\volume1\HDD\APP1.vhdx"
New-VHD -SizeBytes 160GB  -Path $VHDPath -Fixed
```

2. Create an APP1 virtual machine.

```
$VMPath="C:\ClusteredStorage\volume1\VMs\APP1"
New-VM -Name SP -Path $VMPath -MemoryStartupBytes 8GB -BootDevice CD -
SwitchName Management -VHDPath $VHDPath
```

3. Configure the APP1 virtual machine.

```
Set-VMProcessor –VMName APP1 –Count 4
Add-VMNetworkAdapter –VMName APP1–Name Application
Connect-VMNetworkAdapter –VMName APP1 –Name Application –Name Application
Connect-VMNetworkAdapter –VMName APP1 –Name Application –Name Management
Set-VMNetworkAdapterVlan –VMName APP1 –VMNetworkAdapterName Management –
Access –VlanId 25
Set-VMNetworkAdapterVlan –VMName APP1 –VMNetworkAdapterName Application –
Access –VlanId 26
```

4. Add SAN switch to an APP1 virtual machine.

```
Add-VMFibreChannelHba –VMName APP1 –SanName SANSWITCH1
Add-VMFibreChannelHba –VMName APP1 –SanName SANSWITCH2
```

5. Repeat steps 1 through 4 to create APP2 virtual machine by changing the name to APP2.

Next steps

Next, configure the DB virtual machines after configuring the WFE and APP virtual machines.

Configuring DB virtual machines

About this task

This section lists the database virtual machine specifications and provides the steps to create DB VMs.

Table 9. SharePoint database servers specification

Component	Details	
SharePoint database servers	2 x Hyper-V virtual machines	
	Processor	6 x virtual processors
	Memory	64GB
	OS VHDX	1 x 160GB stored on the VM store array

Component	Details	
	Data volumes	4 x 650GB volume for SharePoint Content DB 4 x 100GB volume for SharePoint Content Log 6 x 50GB volume for temp DB 1 x 200GB volume for search DB 1 x 200GB volume for usage DB 1 x 100GB volume for other SharePoint DB
	Quorum volume	1 x 1GB for the cluster Quorum configuration
	Network	3 x network adapters for management, SQL application, and SQL cluster private connectivity 2 x virtual FC adapters for FC connectivity

Perform the following steps to create DB1 virtual machine for the specifications mentioned in the table:

Steps

1. Create fixed VHD for better IO performance.

```
$VHDPath="C:\ClusteredStorage\volume1\HDD\DB1.vhdx"
New-VHD -SizeBytes 160GB  -Path $VHDPath -Fixed
```

2. Create a DB1 virtual machine.

```
$VMPath="C:\ClusteredStorage\volume1\VMs\DB1"
New-VM -Name SP -Path $VMPath -MemoryStartupBytes 64GB -BootDevice CD -
SwitchName Management -VHDPath $VHDPath
```

3. Configure the DB1 virtual machine.

```
Set-VMProcessor -VMName DB1 -Count 6
Add-VMNetworkAdapter -VMName DB1-Name Application
Add-VMNetworkAdapter -VMName DB1-Name SQLPrivate
Connect-VMNetworkAdapter -VMName DB1 -Name Application -SwitchName
Application
Connect-VMNetworkAdapter -VMName DB1 -Name Management -SwitchName Management
Connect-VMNetworkAdapter -VMName DB1 -Name SQLPrivate -SwitchName SQLPrivate
Set-VMNetworkAdapterVlan -VMName DB1 -VMNetworkAdapterName Management -
Access -VlanId 25
Set-VMNetworkAdapterVlan -VMName DB1 -VMNetworkAdapterName Application -
Access -VlanId 26
Set-VMNetworkAdapterVlan -VMName DB1 -VMNetworkAdapterName SQLPrivate -
Access -VlanId 28
```

4. Add SAN switch to a DB1 virtual machine.

```
Add-VMFibreChannelHba –VMName DB1 –SanName SANSWITCH1
Add-VMFibreChannelHba –VMName DB1 –SanName SANSWITCH2
```

5. Repeat steps 1 through 4 to create DB2 virtual machine by changing the name to DB2.

Next steps

The configuration of SharePoint WFE, APP, and DB servers is now complete.

Installing Windows Server 2012 R2 operating system in the virtual machine

1. Power on the server and press any key only after you see the message `Booting from Virtual CD`.

   Press any key to boot from CD or DVD.

   The Windows server setup is displayed.
2. Provide language preference, time and currency format, keyboard or input method, and then click **Next**.
3. In Windows Setup, click **Install now**.
4. Provide the product key and then click **Next**.
5. Select **OS - Windows Server 2012 R2 Datacenter (Server with GUI)** and then click **Next**.
6. In **License terms**, select **I accept the license terms** and then click **Next**.
7. In installation type, select **Custom: Install windows only (advanced)**.
8. Select **Drive0 Unallocated Space**, and then click **New** to create the partition and click **Next** twice.
9. In the message – `To ensure that all Windows features work correctly, Windows might create additional partitions for system files`, click **OK**.
10. Once the installation is complete, in **Setting page**, set the user name and password details.

Initializing and formatting the storage volumes

The storage volumes are formatted with 64 K allocation unit to maximize the disk performance. Run the following Windows PowerShell commands to initialize and format the storage volumes on all the SharePoint and database servers:

NOTE: Ensure that both the database servers are assigned the same drive letter for a LUN.

1. Get newly added storage volumes.

   ```
   Get-Disk | where-object Isoffline -eq $True
   ```
2. Initialize the disk.

   ```
   Initialize-Disk -Number 1 -PartitionStyle MBR
   ```
3. Partition the disk.

   ```
   New-Partition -DiskNumber 1  -DriveLetter 'E' –UseMaximumSize
   ```
4. Format the volume.

   ```
   Format-Volume -DriveLetter 'E' -FileSystem NTFS -AllocationUnitSize 65536 -
   Confi
   rm:$false
   ```
5. Repeat steps 1 through 4 for all the storage volumes that are assigned to the server.

Renaming and adding servers to a domain

1. Run the Windows PowerShell command to change server name.

   ```
   Rename-Computer –NewName "type the computer name" –Restart –Force
   ```
2. Run the Windows PowerShell command to add server to a domain.

```
Add-Computer -DomainName <domainname> -Restart
```

At the Window prompt, type the credentials of the domain controller.

Load Balancing for SharePoint 2013 SP1

In a test environment, a KEMP LoadMaster (Vers:7.1-26-15) was used to load balance the SharePoint 2013 SP1 infrastructure.

Prerequisites

NOTE: Customers can use their existing load balancing solution to load balance SharePoint 2013 SP1.

Steps

1. Log in to the KEMP admin console and go to **Virtual Services** → **View/Modify Services** → **Add New**.
2. Type the IP address for the service in the **Virtual Address** field. Enter the port, protocol, and service name, and then click **Add this Virtual Service**.
3. Ensure that **Force L7** check box is selected, but the **L7 Transparency** check box is clear.
4. Since SharePoint 2013 SP1 does not require persistence anymore, make sure that the **Persistence Options** is set to **None**.
5. For the **Load method/Scheduling method**, select **Round-Robin**.

   NOTE: Under **Real Servers**, configure the health checks. Make sure the KEMP LoadMaster set to use **HTTPS** protocol. This together with Checked Port: **443** and URL: "/owa". Click the **Set URL** button to save the settings.
6. Click the **Add New** button under **Real Servers**. Add your SharePoint 2013 SP1 client servers. When all servers are added, click the **Back** button.
7. When the configuration is complete, press the **Back** button.

   The services should then show up as green if the protocols are available.

   NOTE: Ensure that the virtual service IP address of the load balancer has a DNS entry made in the DNS server.

Next steps

This completes the configuration of the KEMP load balancer.

Configuring the SharePoint database servers

About this task

To configure the SharePoint database servers, perform the following tasks:

Steps

1. Install and configure Windows failover clustering. See Installing and configuring Windows cluster.
2. Install SQL Server failover clustering. See Installing SQL Server 2014 failover cluster.

Installing and configuring Windows cluster

To configure failover clustering in Windows Server 2012 R2, perform the following:

1. Enable failover clustering in Windows Server 2012 R2. See the Enabling failover clustering in Windows Server 2012 R2 section of the *Microsoft Windows Server 2012 R2 - Hyper-V on Dell PowerEdge FX2s Deployment Guide*, which is available at, http://en.community.dell.com/techcenter/extras/m/white_papers/20441315.

2. Create cluster. See the Creating cluster section of the *Microsoft Windows Server 2012 R2 - Hyper-V on Dell PowerEdge FX2s Deployment Guide*, which is available at,http://en.community.dell.com/techcenter/extras/m/white_papers/20441315.

Installing SQL Server 2014 failover cluster

Prerequisites

Before you begin, ensure that the SQL Server installation media is ready to start the installation

About this task

Install an SQL Server cluster instance in following sequence:

1. Run the setup in the first node.
2. After the initial installation in the first node, run **setup.exe** in all the other nodes where you want to install the SQL Server clustered instance.

Installing SQL Server failover cluster in the first node

About this task

Perform the following steps to install SQL Server failover cluster in the first node:

Steps

1. Run Setup.exe as Administrator.

   The **SQL Server Installation Center** window is displayed.
2. Select **Installation** in the left pane and click **New SQL Server failover cluster installation** to start the installation.
3. In the **Product key** window, enter the product key and click **Next >**.
4. In the **License Terms** window, select **I Accept the license terms** and click **Next >**.

   The installation wizard runs a validation in the **Global Rules** window to determine problems and report, if any.
5. In the **Microsoft Update** window, select **Use Microsoft Update to check for updates (recommended)** and click **Next >**.
6. Click **Next >** to install the failover cluster.
7. In the **Install Failover Cluster Rules** window, review and resolve the reported errors before you continue with the next steps, if any. Click **Next>**.
8. In the **Setup Role** window, select **SQL Server Feature Installation** and click **Next >**.
9. In the **Feature Selection** window, select **Database Engine Services** and **Management Tools — Basic**, and then click **Next >**.
10. In the **Feature Rules** window, ensure that all the rules have passed, and then click **Next >**.
11. In the **Instance Configuration** window, enter the SQL Server instance network name in **SQL Server Network Name**. Click **Next >**.
12. In the **Cluster Resource Group** window, specify SQL Server cluster resource group name and click **Next >**.
13. In the **Cluster Disk Selection** window, proceed with the default cluster disk selection and click **Next >**.
14. In the **Cluster Network Configuration** window, select the **IPv4** network and configure the IP address.
15. In the **Server Configuration** window, enter the respective domain accounts and passwords for the SQL Server agent and SQL Server engine. On the **Collation** tab, click **Customize** and select **Latin1_General** for **Collation Designation**. On the **Collation** tab, select **Accent-sensitive**, **Kana-sensitive**, **Width-sensitive** and click **OK**.
16. In the **Server Configuration** tab of the **Database Engine Configuration** window, select **Windows authentication mode** and click **Add** to enter the SQL server administrators. In the **Database Engine**

Configuration window, click the **Data Directories** tab and define the paths for disks or path of the root or system databases directory, user databases, log files, backup and TempDB.to store the files corresponding to the SQL database. Click **Next >**.

17. In the **Feature Configuration** window, click **Next >**.
18. In the **Ready to Install** window, review all the displayed configurations and click **Install**.

    The wizard displays the installation progress and prompts you with the **Complete** window after the installation is over. This completes the initial installation in the first node.
19. In the **Complete** window, verify that all the items are successfully installed, and then click **Close**.

    Now, add the other nodes to the SQL Server failover clustered instance.

Installing SQL Server 2014 failover cluster in the second node

About this task

Perform the following steps to install SQL Server failover cluster in the second node:

Steps

1. Run the SQL Server setup as Administrator to add SQL Server clustered instance in another node.
2. Select **Installation** in the left pane and click **Add node to a SQL Server failover cluster**.
3. In the **Product key** window, confirm the product key again and click **Next >**.
4. In the **License Terms** window, accept the license terms and click **Next >**
5. In the **Microsoft Update** window, select **Use Microsoft Update to check for updates (recommended)** and click **Next >**.
6. In the **Node Rules** window, review and resolve the reported errors before proceeding, if any. Click **Next>**.
7. In the **Cluster Nodes Configuration** window, select the SQL Server instance that you want to add to the node.
8. In the **Cluster Network Configuration** window, select the **IPv4** network and configure the IP address.
9. In the **Service Accounts** window, enter and confirm the SQL Server agent and SQL Server engine passwords.
10. In the **Feature Rules** window, review all the displayed rules and click **Next >**.
11. In the **Ready to Add Node** window, confirm the settings and click **Install**.

    The wizard displays the installation progress and prompts you with the **Complete** window after the installation is over.
12. Click **Close** to exit the installation wizard.

Next steps

The SQL Server failover cluster installation is now complete.

Configuring SQL Server 2014

About this task

Perform the following steps to get optimum database performance:

Steps

1. Open SQL Server Management Studio, click **New Query** on the menu.
2. Configure SQL Server memory settings. See Configuring SQL Server memory settings.
3. Configure SQL Server MAXDOP settings. See Configuring SQL Server MAXDOP settings.
4. Move temp database to another volume. See Moving temp database to another volume.
5. Add additional temp DB data files. See Adding new temp DB data files.

Configuring SQL Server memory settings

Run the following SQL query to set the maximum memory:

```
sp_configure 'show advanced options', 1;
GO
RECONFIGURE;
GOsp_configure 'max server memory', 49152;
GO
RECONFIGURE;
GO
```

Configuring SQL Server MAXDOP settings

Run the following SQL query to set the MAXDOP settings to 1:

```
USE Master ;
GO
EXEC sp_configure 'show advanced options', 1;
GO
RECONFIGURE WITH OVERRIDE;
GO
EXEC sp_configure 'max degree of parallelism', 1;
GO
RECONFIGURE WITH OVERRIDE;
GO
```

Moving temp database to another volume

About this task

To isolate the temp DB IO operations from other databases, the temp DB is moved to a different volume.

Perform the following steps to move the temp database to another volume:

Steps

1. Open SQL Server Management Studio, click **New Query** on the menu.
2. Run the following SQL query to move the temp DB files.

   ```
   USE master;
   GO
   ALTER DATABASE tempdb
   MODIFY FILE (NAME = tempdev, FILENAME = 'E:\SQLData\tempdb.mdf');
   GO
   ALTER DATABASE tempdb
   MODIFY FILE (NAME = templog, FILENAME = 'E:\SQLLog\templog.ldf');
   GO
   ```
3. Restart SQL Server service.

Adding new temp DB data files

Run the following SQL query to add temp DB data file:

```
ALTER DATABASE tempdb ADD FILE ( NAME = N'tempdev2',
FILENAME = N'D:\Data\tempdev2.ndf' , SIZE = 512MB , FILEGROWTH = 256MB)
GO
```

Repeat the query mentioned by changing the name and path of the remaining four volumes.

Configuring prerequisites to install SharePoint 2013 SP1

About this task

Perform the following tasks to install SharePoint Server 2013 SP1:

Steps

1. Download all the prerequisite files for SharePoint Server 2013 SP1 on Windows Server 2012 R2. See Downloading SharePoint 2013 SP1 prerequisites.
2. Run Windows PowerShell scripts to install the prerequisite files. See Configuring prerequisites to install SharePoint 2013 SP1.

Downloading SharePoint 2013 SP1 prerequisites

To install the SharePoint 2013 SP1 prerequisites, download the prerequisite files mentioned in the following table and copy the prerequisite files to the **SharePoint prerequisiteinstallerfiles**.

The following table provides the complete list of SharePoint 2013 SP1 prerequisites files and the downloadable links:

NOTE: Before downloading the prerequisite files into the **SharePoint prerequisiteinstallerfiles**, create a folder such as, **C:\software\SharePoint** and store the SharePoint bits in this folder and the prerequisite files in the **SharePoint\prerequisiteinstallerfiles** folder.

Table 10. SharePoint 2013 SP1 prerequisite files

Prerequisite files	Download links
Microsoft SQL Server 2008 R2 SP1 Native Client	http://download.microsoft.com/download/9/1/3/9138773A-505D-43E2-AC08-9A77E1E0490B/1033/x64/sqlncli.msi
Microsoft Sync Framework Runtime v1.0 SP1 (x64)	http://download.microsoft.com/download/E/0/0/E0060D8F-2354-4871-9596-DC78538799CC/Synchronization.msi
Windows Server App Fabric	http://download.microsoft.com/download/A/6/7/A678AB47-496B-4907-B3D4-0A2D280A13C0/WindowsServerAppFabricSetup_x64.exe
Cumulative Update Package 1 for Microsoft AppFabric 1.1 for Windows Server (KB2671763)	http://download.microsoft.com/download/7/B/5/7B51D8D1-20FD-4BF0-87C7-4714F5A1C313/AppFabric1.1-RTM-KB2671763-x64-ENU.exe
Windows Identity Foundation (KB974405)	http://download.microsoft.com/download/D/7/2/D72FD747-69B6-40B7-875B-C2B40A6B2BDD/Windows6.1-KB974405-x64.msu
Microsoft Identity Extensions	http://download.microsoft.com/download/0/1/D/01D06854-CA0C-46F1-ADBA-EBF86010DCC6/rtm/MicrosoftIdentityExtensions-64.msi
Microsoft Information Protection and Control Client	http://download.microsoft.com/download/9/1/D/91DA8796-BE1D-46AF-8489-663AB7811517/setup_msipc_x64.msi
Microsoft WCF Data Services 5.0	http://download.microsoft.com/download/8/F/9/8F93DBBD-896B-4760-AC81-646F61363A6D/WcfDataServices.exe

Prerequisite files	Download links
Microsoft WCF Data Services 5.6	http://download.microsoft.com/download/1/C/A/1CAA41C7-88B9-42D6-9E11-3C655656DAB1/WcfDataServices.exe NOTE: Ensure that after downloading, rename WcfDataServices.exe to WcfDataServices56.exe .

Installing SharePoint 2013 SP1 prerequisite files

About this task

In Windows Server 2012 R2, run the following Windows PowerShell scripts as Administrator:

Steps

1. Install roles and features on Windows Server 2012 R2.

   NOTE: To run the Windows PowerShell script, ensure that you provide the Windows 2012 R2 media path in the code and save the code with .ps1 extension.

   ```
   $windows2012R2Path="D:\sources\sxs"
   Import-Module ServerManager
   Add-WindowsFeature Net-Framework-Features -Source
   $windows2012R2Path
   ```

2. Install all the prerequisites by running the following script:

   NOTE: To run the PowerShell script, ensure that you provide the SharePoint install path in the code.

   ```
   $SharePoint2013Path="C:\software\SharePoint"
   Start-Process "$SharePoint2013Path\PrerequisiteInstaller.exe" -ArgumentList
   "/SQLNCli:$SharePoint2013Path\PrerequisiteInstallerFiles\sqlncli.msi
   /IDFX:$SharePoint2013Path\PrerequisiteInstallerFiles\Windows6.1-KB974405-
   x64.msu
   /IDFX11:$SharePoint2013Path\PrerequisiteInstallerFiles
   \MicrosoftIdentityExtensions-64.msi
   /Sync:$SharePoint2013Path\PrerequisiteInstallerFiles\Synchronization.msi
   /AppFabric:$SharePoint2013Path\PrerequisiteInstallerFiles
   \WindowsServerAppFabricSetup_x64.exe
   /KB2671763:$SharePoint2013Path\PrerequisiteInstallerFiles\AppFabric1.1-RTM-
   KB2671763-x64-ENU.exe
   /MSIPCClient:$SharePoint2013Path\PrerequisiteInstallerFiles
   \setup_msipc_x64.msi
   /WCFDataServices:$SharePoint2013Path\PrerequisiteInstallerFiles
   \WcfDataServices.exe
   /WCFDataServices56:$SharePoint2013Path\PrerequisiteInstallerFiles
   \WcfDataServices56.exe"
   ```

   The **Microsoft SharePoint 2013 Products Preparation Tool** displays the prerequisite installation is in progress. After the installation is complete, reboot the server.

Next steps

The prerequisite installation needs to be done on all the SharePoint web and application servers.

Installing SharePoint Server 2013 SP1

Prerequisites

After all the prerequisites for installing SharePoint Server 2013 SP1 are installed and configured as specified in Configuring prerequisites to install SharePoint 2013 SP1, install SharePoint 2013 Server SP1. The following tables specify all the user accounts required for SharePoint 2013 SP1:

Table 11. User accounts for SQL Server

Name	Description	Local rights	Domain rights
SQL_Admin	The SQL Server service account is used to run SQL Server	Local administrator on the SQL Server	Domain user

Table 12. User accounts for SharePoint Server

Name	Description	Local rights	Domain rights
SP_Farm	The server farm account is used to set up and perform other administrative tasks.	Local administrator on all the SharePoint Servers	Domain user
		SecurityAdmin and DB_Creator rights on the SQL instance	
Web_App	The pool account is used to run the Web application pools	None	Domain user
SP_SearchService	The services account is used to run the Service application pool	None	Domain user
SP_Others	Generic services	None	Domain user
SP_UserProfiles	User profile	None	Domain user Replicate Directory Changes permission on the domain.

About this task

Perform the following tasks to install SharePoint Server 2013 SP1.

Steps

1. Copy the following configuration code in Notepad and save the file as **config.xml**.

   NOTE: Specify the SharePoint 2013 SP1 Product ID in the config.xml script, and then copy the file to the SharePoint installation folder.

```
<Configuration>
<Package Id="sts">
  <Setting Id="LAUNCHEDFROMSETUPSTS" Value="Yes"/>
</Package>
<Package Id="spswfe">
  <Setting Id="SETUPCALLED" Value="1" />
  </Package>
```

```
  <PIDKEY Value="<Type SharePoint 2013 PID>" />
     <Display Level="none" CompletionNotice="no" />
  <Setting Id="SERVERROLE" Value="APPLICATION" />
  <Setting Id="USINGUIINSTALLMODE" Value="0" />
  <Setting Id="SETUP_REBOOT" Value="Never" />
  <Setting Id="SETUPTYPE" Value="CLEAN_INSTALL" />
    <INSTALLLOCATION Value="D:\Program Files\Microsoft Office Servers
\15.0" />
    <DATADIR Value="D:\Data"/>
<Logging
    Type="Verbose"
    Path="D:\SharePoint 2013 Install Logs"
    Template="Setup-Custom-ConfigXML-*.txt"
/>
</Configuration>
```

2. Run the following Windows PowerShell command to start SharePoint installation.

   NOTE: Ensure to specify the SharePoint path in the code.

```
$SharePointpath="C:\software\SharePoint"
Start-Process $SharePointpath\setup.exe -ArgumentList "/config config.xml" -
Wait
```

Next steps
Install SharePoint Server 2013 SP1 on all the SharePoint servers.

Configuring SharePoint Server 2013 SP1

About this task
Complete the following tasks to configure SharePoint Server 2013 SP1:

Steps

1. Create a SharePoint farm. See Creating a SharePoint farm.
2. Add servers to the SharePoint farm. See Adding servers to the SharePoint farm.
3. Configure search index in the SharePoint application server. See Configuring search topology.

Creating a SharePoint farm

About this task
Perform the following steps to create a farm by using Windows PowerShell commands:

Steps

1. Load the SharePoint module.

```
Add-PsSnapin Microsoft.SharePoint.PowerShell -ErrorAction SilentlyContinue
```

2. Create a SharePoint farm.

```
New-SPConfigurationDatabase –DatabaseName "SharePoint_Config" –
DatabaseServer
"DatabaseClustername" –AdministrationContentDatabaseName
“SharePoint_AdminContent” –
Passphrase (ConvertTo-SecureString "EnterPassphrase" –AsPlaintext –Force) –
FarmCredentials (Get-Credential)
```

   At the Window prompt, type the farm administrator domain credentials.

   NOTE: You can change the Database Server name and Passphrase as per your environment.

3. Complete the configuration.

```
Install-SPHelpCollection –All
Initialize-SPResourceSecurity
Install-SPService
Install-SPFeature –AllExistingFeatures
New-SPCentralAdministration -Port <type a port number> -WindowsAuthProvider
"NTLM"
Install-SPApplicationContent
```

NOTE: Ensure to perform steps 1 through 3 only once in the SharePoint farm that hosts the central administration site.

Next steps
The installation of SharePoint Server and creating a SharePoint farm is complete and you can now add the second application server and two WFE servers to the SharePoint farm.

Adding servers to the SharePoint farm

About this task
Perform the following steps to add a server to an existing SharePoint 2013 farm:

Steps

1. Open a PowerShell window as Administrator.
2. Load the SharePoint module.

NOTE: Ensure that you use the same database name and passphrase used of creating a SharePoint farm.

```
Add-PsSnapin Microsoft.SharePoint.PowerShell -ErrorAction SilentlyContinue
Connect-SPConfigurationDatabase -DatabaseServer " DatabaseClustername " -
DatabaseName
"SharePoint_Config" -Passphrase (ConvertTo-SecureString "EnterPassphrase" -
AsPlainText -Force)
Initialize-SPResourceSecurity
Install-SPService
Install-SPFeature –AllExistingFeatures
```

Next steps
The servers are now added to the farm and you can distribute the services that run on each server to allocate and distribute the load.

Adding managed accounts

The following section provides the commands to add the domain user account as SharePoint managed account.

```
$cred = Get-Credential
New-SPManagedAccount -Credential $cred
```

At the Window prompt, provide the credentials for the SharePoint managed accounts.

Creating a web application

Run the following Windows PowerShell commands to create a web application:

```
$siteName = “Site Name”
$port = 80
$hostHeader = <“Type the host header”>

$url = <"Type the url">
```

```
$appPoolName = <"Type the Site Name">

$managedAccount = <"domain\username">

$dbServer = <"Clustered Database Server Name">

$dbName = <"Type the content DB name">

$allowAnonymous = $true

$authenticationMethod = "NTLM"

$ssl = $false

New-SPWebApplication -Name $siteName -Port $port -HostHeader $hostHeader -URL
$url
$url -ApplicationPool $appPoolName -ApplicationPoolAccount
(Get-SPManagedAccount "$managedAccount") -DatabaseName $dbName
-DatabaseServer $dbServer -AllowAnonymousAccess: $allowAnonymous
-AuthenticationMethod $authenticationMethod -SecureSocketsLayer:$ssl
```

Run the following Windows PowerShell commands to create site collection:

```
$url = <"Type the site url">
$ContentDatabase = <"Type the content DB name">
$WebsiteName = <"Type the site name">
$description = <Type the team site">
$Template = "STS#0"
$PrimaryLogin = "domain\user"
$PrimaryEmail = "user@domain.com"

New-SPSite -Url $url -ContentDatabase $ContentDatabase -Name $WebsiteName -
Description
$description -Template $Template -OwnerAlias $PrimaryLogin -OwnerEmail
$PrimaryEmail
```

Run the Windows PowerShell commands again to create additional sites.

Configuring service application

Perform the following steps to configure user profile service application in SharePoint 2013 SP1:

1. Configure SharePoint 2013 SP1 search topology. See Configuring search topology.
2. Create a user profile service application by using Central Administration. See Creating user profile.
3. Set up managed metadata service. See Creating managed metadata service.
4. Enable the session state service. See Enabling session state.

Configuring search topology

About this task

To configure SharePoint search topology on the application servers, perform the following steps:

Steps

1. Log in to the first application server and open the Windows PowerShell command as Administrator.
2. Load the Powershell snap-in.

   ```
   Add-PSSnapin Microsoft.SharePoint.PowerShell -ErrorAction SilentlyContinue
   ```

3. Create a search service application.

```
$App1 = "APP1"
$APP2 = "APP2"
$WFE1 = "WEB1"
$WFE2 = "WEB2"
$SearchAppPoolName = "SharePoint_SearchApp"
$SearchAppPoolAccountName = "Domain\User"
$SearchServiceName = "SharePoint_Search_Service"
$SearchServiceProxyName = "SharePoint_Search_Proxy"
$DatabaseName = "SharePoint_Search_AdminDB"
```

4. Create a search service application pool.

```
$spAppPool = New-SPServiceApplicationPool -Name $SearchAppPoolName -Account
$SearchAppPoolAccountName -Verbose
```

5. Start search service instance on all SharePoint servers.

```
Start-SPEnterpriseSearchServiceInstance $App1 -ErrorAction SilentlyContinue
Start-SPEnterpriseSearchServiceInstance $App2 -ErrorAction SilentlyContinue
Start-SPEnterpriseSearchServiceInstance $WFE1 -ErrorAction SilentlyContinue
Start-SPEnterpriseSearchServiceInstance $WFE2 -ErrorAction SilentlyContinue
```

6. Ensure that the search service is running on all the SharePoint servers.

```
Get-SPEnterpriseSearchServiceInstance -Identity $APP1
Get-SPEnterpriseSearchServiceInstance -Identity $APP2
Get-SPEnterpriseSearchServiceInstance -Identity $WFE1
Get-SPEnterpriseSearchServiceInstance -Identity $WFE2
```

7. Create search service application.

```
$ServiceApplication = New-SPEnterpriseSearchServiceApplication -Name
$SearchServiceName -ApplicationPool $spAppPool.Name -DatabaseName
DatabaseName
```

8. Create search service proxy.

```
New-SPEnterpriseSearchServiceApplicationProxy -Name $SearchServiceProxyName
-SearchApplication $ServiceApplication
```

9. Create a new topology.

```
$ssa = Get-SPEnterpriseSearchServiceApplication
$newTopology = New-SPEnterpriseSearchTopology -SearchApplication $ssa
```

10. Create one admin component.

```
New-SPEnterpriseSearchAdminComponent –SearchTopology $newTopology -
SearchServiceInstance $App1
```

11. Create two content processing components for HA.

```
New-SPEnterpriseSearchContentProcessingComponent –SearchTopology
$newTopology -SearchServiceInstance $App1
New-SPEnterpriseSearchContentProcessingComponent –SearchTopology
$newTopology -SearchServiceInstance $App2
```

12. Create two analytics processing components for HA.

```
New-SPEnterpriseSearchAnalyticsProcessingComponent –SearchTopology
$newTopology -SearchServiceInstance $App1
New-SPEnterpriseSearchAnalyticsProcessingComponent –SearchTopology
$newTopology -SearchServiceInstance $App2
```

13. Create two crawl components for HA.

```
New-SPEnterpriseSearchCrawlComponent –SearchTopology $newTopology -
SearchServiceInstance $App1
New-SPEnterpriseSearchCrawlComponent –SearchTopology $newTopology -
SearchServiceInstance $App2
```

14. Create two query processing components for HA.

```
New-SPEnterpriseSearchQueryProcessingComponent –SearchTopology $newTopology
-SearchServiceInstance $WFE1
New-SPEnterpriseSearchQueryProcessingComponent –SearchTopology $newTopology
-SearchServiceInstance $WFE2
```

15. Create search components.

```
New-SPEnterpriseSearchIndexComponent –SearchTopology $newTopology -
SearchServiceInstance $APP1 –IndexPartition 0
New-SPEnterpriseSearchIndexComponent –SearchTopology $newTopology -
SearchServiceInstance $APP2 –IndexPartition 0
New-SPEnterpriseSearchIndexComponent –SearchTopology $newTopology -
SearchServiceInstance $APP2 –IndexPartition 1
New-SPEnterpriseSearchIndexComponent –SearchTopology $newTopology -
SearchServiceInstance $APP1 –IndexPartition 1
```

16. Activate the search topology.

```
Set-SPEnterpriseSearchTopology -Identity $newTopology
```

17. Verify the search topology once the configuration is complete.

```
Get-SPEnterpriseSearchTopology -SearchApplication $ssa
```

Next steps

The creating and configuring a SharePoint 2013 SP1 search service application is now complete and you can follow these steps to extend support for a bigger size farm.

Creating user profile

About this task

Perform the following steps to create a user profile service application by using the SharePoint Central Administration website:

Steps

1. Open SharePoint 2013 Central Administration and click **Application Management**.
2. In the **Application Management** section, click **Manage service applications**.
3. On the **Manage Service Applications** page, click the **Service Applications** tab to activate the menu.
4. On the menu, click **New**, and then select **User Profile Service Application** from the list of service applications to create.
5. In the **Create New User Profile Service Application** dialog box, in the **Name** field, type a name for the user profile service application.
6. In the **Application Pool** section, select **Create a new application pool** and type the application pool name.
7. In the **Application Pool** section, for the **Select a security account for this application pool** option, select **Configurable** and choose an existing managed account.
8. In the **Profile Database** section, in the **Database Server** field, type the name of the database server. In the **Database Name** field, type the database name.
9. In the **Profile Database** section, for the **Database authentication** option, select **Windows authentication (recommended)**.
10. In the **Synchronization Database** section, in the **Database Server** field, type the name of the database server. In the **Database Name** field, type the name of the database.
11. In the **Synchronization Database** section, for the **Database authentication** option, select **Windows authentication (recommended)**.
12. In the **Social Tagging Database** section, in the **Database Server** field, type the name of the database server. In the **Database Name** field, type the name of the database.
13. In the **Social Tagging Database** section, for the **Database authentication** option, select **Windows authentication (recommended)**.

14. In the **Profile Synchronization Instance** section, select application server name.
15. Retain the other settings to the default values and click **Create** to create user profile service application.
16. In the **Site Naming Format** section, select **User name (do not resolve conflicts)**.
17. In the **Default Proxy Group** section, select **Yes**.
18. In the **Yammer Integration** section, select **Use on-premise SharePoint social functionality**.
19. Click **Create**.

    The user profile service application is successfully created.
20. Navigate to **Application Management** → **Service Application** → **Manage Services on server** to configure the user profile.
21. Start the **User Profile Synchronization Service**.
22. At the User Profile Synchronization Service prompt, type the password and click **OK**.
23. Navigate to **Central Administration** → **Application Management** → **Manage Service Application** → **User Profile Service** → **Configure Synchronization Connection** to configure synchronization connection.
24. Click **Create New Connection**.
25. In the **Add new synchronization connection**, do the following:
    a. Type the connection name in the **Connection Name** filed.
    b. Select **Active Directory** in the **Type** field.
    c. In the **Connection Settings** section, type the domain name in the **Forest name** field.
    d. In the **Connection Settings** section, type the domain user name in the **Account name** field.
    e. Type the password and port value as 389.
    f. Click **Populate Containers**.

    NOTE: Ensure that the replicate directory changes permission has been granted to the search application domain user name on your domain.
26. Navigate to **Central Administration** → **Application Management** → **Manage service applications**.
27. Select **User Profile Service**.
28. Click **Start Profile Synchronization** in **Synchronization**.
29. Select **Start Full Synchronization** and click **OK**.

Creating managed metadata service

About this task

Perform the following steps to create and configure the managed metadata service in central administration.

Steps

1. Navigate to **Central Administration** → **Application Management** → **Manage Service applications**.
2. On the **Manage Service Applications** page, click the **Service Applications** tab to activate the menu.
3. On the menu, click **New**, and then select **Managed Metadata Service**.
4. In the **Create New Managed Metadata Service** dialog box, in the **Name** field, type a name, database server name, database name, and select **Windows authentication (recommended)**.
5. In the **Application Pool** section, select **Create a new application pool** and type the application pool name.
6. In the **Application Pool** section, for the **Select a security account for this application pool** option, select **Configurable** and select an existing managed account.
7. Click **OK** to create a managed metadata service.

Enabling session state

Run the following Windows PowerShell command to create a session database and activate the session database service:

Example

```
Enable-SPSessionStateService -DatabaseServer<Database Server Name> -DatabaseName
<Database Name> —SessionTimeout 120
```

Moving content databases to another volume

About this task

Perform the following tasks to move the content databases in your SharePoint 2013 farm by using Windows PowerShell.

Steps

1. Detach the content databases from a web application.

   Load the SharePoint PowerShell snap-in and run the following Windows PowerShell command:

   ```
   Dismount-SPContentDatabase "<ContentDB>"
   ```

2. Detach the content databases from the SQL server by performing the following:
   a. In SQL Server Management Studio, open the source SQL server instance, and then expand the **Databases** node.
   b. Right-click the content database, click **Tasks** → **Detach**. Repeat this step for each content database that you want to move.
3. Move the content databases to a new location by performing the following:
   a. Locate the .mdf and .ldf files for the content databases by using Windows Explorer.
   b. Select the .mdf and .ldf files for the database that you want to move and either copy or move them to the destination directory.
4. Attach the content databases to the same instance of SQL Server by performing the following:
   a. In SQL Server Management Studio, open the destination SQL Server instance.
   b. Right-click the **Databases** node, click **Tasks** → **Attach**.
   c. In the **Attach Database** dialog box, browse to the location you transferred the .mdf and .ldf files and select the .mdf file for the database that you want to attach. Click **OK**.
5. Repeat steps 1 through 4 for each content database that you are want to move..
6. Attach the content databases to the web application.

   Load the SharePoint PowerShell snap-in and run the following Windows PowerShell command:

   ```
   Mount-SPContentDatabase "<ContentDB>" -DatabaseServer "<DBServer>" -
   WebApplication <http://SiteName>
   ```

Next steps

This completes the movement of the content databases to another volume.

5

Verifying the deployment

About this task

Once the deployment is complete, you can refer to the following steps to verify that SharePoint 2013 SP1 is installed successfully:

Steps

1. Run the following Windows PowerShell command and ensure that the sharepoint_config status is online.

   ```
   Get-spfarm
   ```

2. Open the **Central Administration** page from any of the SharePoint servers and make sure the page is accessible.
3. Shut down one of the WFE server and access the web application.
4. Shut down the active database server and access the web application.

6

Additional Resources

Dell Services and Dell certified channel partners provide consulting solutions to help customers plan, deploy, and manage even the most advanced and complex SharePoint Server configurations.

7

Appendix

For additional information before deploying the solution, you can refer to the following documents:

- Reference Architecture - Microsoft SharePoint Server 2013 on Dell PowerEdge FX
- Dell PowerEdge FX
- Dell Storage SC4020
- Dell Storage SC220
- Overview of farm virtualization and architectures for SharePoint 2013
- Best practice configurations for the SharePoint 2013 virtual machines and Hyper-V environment
- Configuring Dynamic Optimization in VMM