



HPE SMALL BUSINESS SOLUTIONS DEPLOYMENT GUIDE

Microsoft Windows-based solutions

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Revision history

Publication date	Edition	Summary of changes
Apr 2019	1	Initial publication of the HPE Small Business Solutions Deployment Guide
Jun 2019	2	Added HPE RDX Removable Disk Backup System installation instructions
Jul 2019	3	Included Microsoft Windows Server 2019
Aug 2019	4	New chapter on HPE Small Business Solutions for High Availability Storage with Microsoft Storage Spaces Direct
Sept 2019	5	Revision on Rapid Setup to include new features and functions
Oct 2019	6	Revision to include steps for migrating to Microsoft Windows 2019 in Appendix A



OVERVIEW

Purpose

HPE Small Business Solutions are part of the HPE SMB Offers portfolio.¹ They are based on HPE ProLiant Gen10 servers that are equipped to meet the needs of small businesses for a variety of company sizes and use cases. They are also the foundational on-premises component of HPE Small Business Solutions for hybrid cloud.

The **HPE Small Business Solutions Deployment Guide for Microsoft Windows-based solutions** is intended to provide SMBs with general, high-level instructions for deploying HPE Small Business Solutions.

This guide is good for both Microsoft Windows Server 2016 and 2019 but there may be instances where there are subtle differences in the wording or order of the prompts.

Disclaimer

This guide provides basic setup instructions for deploying HPE Small Business Solutions. There are many additional business considerations that are outside of the scope of this document, such as security policies, organizational user and group structure, regulatory compliance, etc. HPE claims no liability as a result of implementing procedures in this guide.

Audience

Important: The intended audience is IT professionals who are familiar with deploying small to midsized business (SMB) information technology solutions on variety of operating systems (OSs) in both on-premises and cloud environments.

Organization

This HPE Small Business Solution Deployment Guide is a “living document” that is periodically updated as new HPE Small Business Solutions are brought to market and new configurations and use cases are developed.

The guide will help customers and partners quickly deploy HPE Small Business Solutions by providing high-level, step-by-step guidance that is grouped into several modules that follow the typical workflow stages of deploying a server in an SMB environment.

¹ HPE Small Business Solution offers are regionally released as “Smart Buy Express Offers” in the U.S. and Canada, “Top Value Offers” in Europe, and “Intelligent Buy Offers” in Asia Pacific and Japan.



INITIAL SETUP

Hardware configuration and operating system installation

This chapter addresses the initial hardware configuration and setup of HPE Small Business Solutions running Windows Server 2016 and 2019 operating system.

NOTE

If you are installing or deploying an HPE Small Business Solution for High Availability Storage with Microsoft Storage Spaces Direct, skip this section and go directly to the [HPE Small Business Solutions for High Availability Storage with Microsoft Storage Spaces Direct](#) section of this guide.

Pre-deployment planning

Deploying an HPE Small Business Solution is relatively simple. Following these four pre-deployment preparation steps will help lead to a smooth deployment.

1. Plan to choose one of four RAID controller setup methods:

- a. **Rapid Setup (Integrated with Intelligent Provisioning version 3.31)** is the latest automated setup feature that is embedded in HPE ProLiant Gen10 300 series and below servers. It greatly decreases the time required to deploy the server, simplifies initial controller and disk drive configuration, and automates OS installation. HPE recommends this method for most HPE Small Business Solution server deployments and is discussed in detail in the following section.

NOTE

Rapid Setup is integrated with HPE Intelligent Provisioning version 3.31 firmware on HPE ProLiant Gen10 300 series and below servers (except MicroServer). HPE ProLiant servers with older versions of Intelligent Provisioning will not have the features described in this guide. Verify your server has HPE Intelligent Provisioning version 3.31 firmware, and perform a firmware upgrade if necessary, before proceeding with the installation steps described below.

NOTE

The ProLiant MicroServer Gen10 does not have Intelligent Provisioning and thus cannot have the integrated version of Rapid Setup described in this document. It can however be configured using the USB-based Rapid Setup, refer to the server MicroServer Gen10 User Guide at support.hpe.com, and the [HPE Rapid Setup Software Installation and Configuration Guide](#) to configure storage and install the operating system on the MicroServer Gen10.

NOTE

Rapid Setup requires that the Microsoft Windows installation software not be an evaluation or MSDN version. These versions are constantly updated by Microsoft and may not include necessary components to boot properly if installed using RSS. If using an evaluation or MSDN version, choose Intelligent Provisioning, not Rapid Setup at the initial screen after pressing F10 at boot-up.

- b. **SMB Setup Software** is the initial version of the automated setup feature embedded in HPE ProLiant Gen10 300 series servers and below. It is part of HPE Intelligent Provisioning version 3.30, which has been superseded by HPE Intelligent Provisioning 3.31 and is not covered in this Deployment Guide. HPE highly recommends updating older HPE ProLiant Gen10 300 and below series server firmware to HPE Intelligent Provisioning 3.31 for a much more robust automated setup experience.



- c. **Rapid Setup (USB Based)** is the USB-based precursor to the integrated SMB Setup. It provided limited automated setup of controller and disk configurations and prepared them for OS installation. The Rapid Setup (USB) method is superseded by the integrated Rapid Setup (Intelligent Provisioning version 3.31). Therefore, it will not be covered in this guide. If Rapid Setup (USB Based) is the desired method, please refer to the [HPE Rapid Setup Software Installation and Configuration Guide](#).
- d. **Manual configuration:** In some cases (such as when deploying a Microsoft Storage Spaces Direct server) you may not want to choose an automated setup. It is possible to manually set up the initial controller and disk drive configuration using one of the following
 - I. For all HPE ProLiant Gen10 300 series servers and below (except the MicroServer Gen10) use the HPE Intelligent Storage Configuration feature of HPE Intelligent Provisioning. Intelligent Provisioning is accessible by pressing F10 during system power-on self-test (POST), or through the HPE Integrated Lights Out (iLO) tool
 - II. For the HPE ProLiant MicroServer Gen10: Use the UEFI storage utility

For manual configuration refer to your server's user guide, which can be downloaded at support.hpe.com.

2. Plan for the source of the Microsoft Windows Server 2016 or 2019 install files, which can be located:

- a. On physical media such as a USB flash drive or DVD
- b. In a shared folder on the network (Note: Requires the iLO network port to receive IP address settings via DHCP)

3. Plan for the initial OS host settings:

Depending on the target environment you may need to know the following:

- a. Host name
- b. Host IP address (if not dynamically assigned via DHCP; a static IP address is recommended for servers in most cases)

NOTE

Rapid Setup Software features that need network connectivity requires the server be connected to an environment that has existing DHCP services. Once the server initial hardware configuration is complete, you can re-configure the host NIC to a static IP address via the host operating system if needed.

- c. Domain name (if joining a domain) and domain credentials with join domain privileges

4. Make sure the local area network (LAN) infrastructure is ready to add a server:

which may include:

- a. Active Directory
- b. Domain name service (DNS—know the IP address of the DNS server if not using DHCP)
- c. Public and private IP addresses and network ranges (DHCP)
- d. Connectivity to the internet (know the default gateway address if not using DHCP)

Server hardware configuration overview

Hardware installation

HPE Small Business Solutions may come with add-on components that are not preinstalled, such as memory DIMMs, Smart Array Controllers, disk drives, etc. For installation guidance, refer to the user guide for your specific system. These can be found at support.hpe.com.



Server storage configuration planning

HPE ProLiant servers are capable of a large variety of storage configurations. This deployment guide focuses on the few standard configurations that are common to HPE Small Business Solutions, which are typically:

1. A pair of low-capacity solid-state drives (SSDs) or hard-disk drives (HDDs) for boot volume
2. A separate set of high-capacity HDDs for data and application storage
3. An HPE Smart Array Controller for managing and securing RAID volumes

The typical Smart Array Controller configuration is to create one RAID 1 volume from the two low capacity SSDs/HDDs, and one RAID 1, RAID 5, or RAID 6 volume from the high capacity HDDs/SSDs (RAID 1 for two HDDs/SSDs; RAID 5 for three or more HDDs/SSDs; or RAID 6 for four or more HDDs/SSDs). There are exceptions to this typical configuration as identified in the following table.

NOTE

One exception worth noting is the HPE Small Business Solution for File and Backup based on the HPE ProLiant MicroServer Gen10. It features a Marvell embedded software RAID controller, a single SSD for the boot volume (installed in the optional internal drive bay taking the place of the DVD/CD ROM drive bay), and two HDDs in the standard drive bays for the data volume. The SSD in the optional internal drive bay is directly attached to the motherboard via a standard SATA port, and cannot be connected to the embedded Marvell RAID controller or to a HPE Smart Array Controller—and thus not configurable as a member of a RAID array. It is intended for the OS to be installed on the optional internal SSD and the two HDDs be mirrored for data protection. If redundant disks are required for the OS, you must use two or more drives installed in the standard drive bays and configure the RAID array accordingly.

You can also get more information from the [HPE Smart Array SR Gen10 Configuration Guide](#).

The recommended disk configuration for the most common HPE Small Business Solutions is shown in the following table.

HPE ProLiant server	Controller	OS volume	Data volume
MicroServer Gen10	Marvell Controller (Embedded)	1 x SSD (not connected to the Marvell Controller)	2 x or 4 x HDD (RAID 1, RAID 10, or use Controller Pass-Through and configure OS RAID)
ML30 Gen10 4 LFF	E208 Smart Array Controller	2 x HDD (RAID 1)	2 x HDD (RAID 1)
ML30 Gen10 8 SFF	E208 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
ML110 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
ML350 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL20 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	2 x HDD (RAID 1)
DL160 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL180 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL325 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL360 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL380 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL385 Gen10	P408 Smart Array Controller	2 x SSD/HDD (RAID 1)	3 x to 6 x HDD (RAID 5)
DL380 Gen10 HA Storage*	P408 Smart Array Controller	2 x M.2 SSD (RAID 1)	4 x HDD (No RAID—storage) 2 x SSD (No RAID—cache)
DL385 Gen10 HA Storage*	P408 Smart Array Controller	2 x M.2 SSD (RAID 1)	4 x HDD (No RAID—storage) 2 x SSD (No RAID—cache)
ML350 Gen10 HA Storage*	P408 Smart Array Controller	2 x M.2 SSD (RAID 1)	4 x HDD (No RAID—storage) 2 x SSD (No RAID—cache)

* HPE Small Business Solutions for High Availability Storage require the manual configuration method due to a unique requirement that disks used for the storage volume not be in a RAID configuration, and that the boot volume be on disks that are not part of the storage volume.



Storage configuration and Microsoft Windows installation using Rapid Setup Software 2.0

This section details the step-by-step instructions for configuring the server storage and installing the Microsoft Windows Server OS.

NOTE

The HPE MicroServer Gen10 does not have iLO, and therefore cannot take advantage of the Rapid Setup Software 2.0. Refer to the server MicroServer Gen10 User Guide at support.hpe.com, and the [HPE Rapid Setup Software Installation and Configuration Guide](#) to configure storage and install the Microsoft OS on the MicroServer Gen10.

NOTE

The following section refers to installing the Microsoft Windows OS on new physical servers. If you need to migrate existing Active Directory-Directory Services (ADDS), file storage data, or applications and databases to Microsoft Windows 2019, please refer to the appendix for more information and guidance.

The following example deployment walk-through assumes the Microsoft Windows Server install file is in one of two locations:

- In an .iso file located in the root directory of a USB stick and the USB is installed on an external USB port
- In an .iso file located in a folder on a network file share (Requires the iLO network port to receive IP address settings via DHCP)

This example also assumes the following hardware is installed, as is common for HPE Small Business Solutions:

- HPE Smart Array Controller
- One or more SSDs or HDDs installed in the standard drive bay(s)

Instructions

1. Install hardware and connect to the network (Requires the iLO network port to receive IP address settings via DHCP if installing the OS from a network share).
2. Boot the server and press F10 during POST.
3. The server will boot into the Intelligent Provisioning boot menu and automatically execute Intelligent Provisioning.
4. At the startup screen, select Rapid Setup.
5. Click the EULA “Accept” button to begin. Rapid Setup will perform an initial scan to detect the RAID controller and drives installed.
6. Review the Azure Services “Learn More” page and click CONTINUE when ready to proceed.
7. Review the Rapid Setup Software task list page and click CONTINUE when ready to proceed.
8. Select whether or not you have a web proxy server in your environment. You can also see your current network settings.
 - a. If you have a proxy server, click YES to open a pop-up and configure the proxy server settings
 - b. If you do not have a proxy server, click “No, it doesn’t”
9. You will be presented one of two options depending on the detected hardware.
 - a. **Auto configuration:** Rapid Setup will automatically recommend an array controller configuration based on the installed controller and drives it detects in the initial scan. You can choose to accept the recommendation, in some cases choose an alternate configuration, or manually configure the controller.

NOTE

Rapid Setup will only automatically recommend a RAID configuration if it detects an S100i (embedded), E208i (PCIe or AROC), or P408i (PCIe or AROC) controller, and at least 1 HDD or SSD in the standard drive cage (M.2 and NVMe drives are not configured by Rapid Setup). In all other cases, only the “Continue” option for Manual Configuration will be enabled.



If a valid configuration is detected, Rapid Setup will inform you which controller is installed and present a graphical representation of the recommended configuration of array volumes and related drives.

The table below lists the possible recommendations depending on installed controller, drives, and number of volumes desired:

Single Volume		
Selected by default if all drives are of the same type, speed, and capacity. User can opt to split 4 or more identical drives into Multiple Volumes		
Installed disks	S100i (Embedded) and E208 Controller	P408 Controller
1 disk	RAID 0	RAID 0
2 disks	RAID 1	RAID 1
3 disks	RAID 5	RAID 5
4 or more disks	RAID 5	RAID 6
Multiple Volumes		
Selected by default if any drives are of different type, speed, or capacity; or if user has opted to split a Single Volume into Multiple Volumes		
Installed disks	S100i (Embedded) and E208 Controller	P408 Controller
All different disks	Each disk in a separate RAID 0 Volume	Each disk in a separate RAID 0 Volume
3 disks (2 identical)	RAID 1 plus RAID 0	RAID 1 plus RAID 0
4 disks (3 identical + 1)	RAID 5 plus RAID 0	RAID 5 plus RAID 0
4 disks (2 identical + 2 identical)	RAID 1 plus RAID 1	RAID 1 plus RAID 1
5 disks	RAID 1 from the 2 smallest capacity identical drives. Remaining matching drives in one or more volumes in priority order RAID 5, 1, or 0 as drive count allows.	RAID 1 from the 2 smallest capacity identical drives. Remaining matching drives in one or more volumes in priority order RAID 5, 1, or 0 as drive count allows.
6 or more disks	RAID 1 from the 2 smallest capacity identical drives. Remaining matching drives in one or more volumes in priority order RAID 5, 1, or 0 as drive count allows.	RAID 1 from the 2 smallest capacity identical drives. Remaining matching drives in one or more volumes in priority order RAID 6, 5, 1, or 0 as drive count allows.

NOTE

The drives in each volume (physical array) must be of the same:

- Type (SAS, SATA, HDD, SSD [including SSD durability: write intensive, mixed use, read intensive])
- Speed (HDD RPM, Interface Transfer Rate)
- Raw data capacity

Example: A system with 2 x 300 GB 10K 12G SAS HDDs and 3 x 1.2 TB 10K 12G SAS HDDs would be configured with a RAID 1 (2 x 300 GB) volume and a RAID 5 (3 x 1.2 TB) volume.

NOTE

Splitting a single volume when all the installed disks are identical:

If 4 or more identical disks are present a prompt will appear asking "Do you want to separate OS volume?." A checkbox will be displayed and you can select this to create OS and data volumes separately. Otherwise all disks will be combined into one volume.

- b. **Manual configuration:** Click "Manual Configuration" if any of the following is true:
- You do not want to use the recommended automatic configuration.
 - If no supported controller is detected (only the "Continue" button will be enabled).



Upon clicking “Continue,” Rapid Setup will collect additional information you will begin setting up the desired storage configuration in Intelligent Storage Configuration.

- I. Click OK on the pop-up to acknowledge the instruction to click the “<” previous button to resume setup after finishing the configurations.
 - II. From the main page of Intelligent Storage Configuration screen, click “+ Create Array.”
 - III. Select the drives you want to include in the RAID array and select the drive usage. The drive bay representation will indicate the drives selected and remaining.
 - IV. Click “Next.”
 - V. Enter a logical name.
 - VI. Select a RAID Mode (for example, RAID 1 or RAID 5).
 - VII. (Optional) Select a stripe size or just accept the default setting.
 - VIII. Select an Accelerator if applicable or just accept the default setting.
 - IX. (Optional) Select a RAID size.
 - X. Click “Next” to review your settings and click “Submit.”
 - XI. (Optional) Repeat steps 7–15 to create another array.
 - XII. Click the “<” button to continue Rapid Setup.
 - XIII. Select the array that will be used for installing the OS and click “Next.”
10. After accepting the recommended configuration, or performing manual configuration, select the OS to install—in this case Microsoft Windows Server—and click “Continue.”
11. In the “Select” pop-up, choose the location of your Windows install media.
- a. Choose automatic scan if the media is on the DVD/CD ROM drive or on USB inserted in the external USB Port.
 - b. Choose SMB/CIFS if the media is located on a network share and then enter the path and provide the credentials required to access the share.
12. Rapid Setup will present a notice that the system will reboot. When the system reboots it will resume the Rapid Setup and copy the installation files to the selected array volume and reboot again.
13. Once the server reboots the Windows setup wizard will begin so you can complete the Windows setup in the next section.

Completing OS installation

Once the Windows setup starts (after the OS files are copied to the OS volume for installation), Windows setup will prompt you for the following information.

- **Regional settings:** Language, time and currency format, and keyboard layout (for most U.S. deployments, you can accept the default settings and click “Next”).
- **Windows version to install:** The Windows setup will present a list of Windows versions to choose from and prompt you to make a selection. Typically, the list looks like this:
 - Windows Server 2016/2019 Datacenter
 - Windows Server 2016/2019 Datacenter (Desktop Experience)
 - Windows Server 2016/2019 Standard
 - Windows Server 2016/2019 Standard (Desktop Experience)

Select the desired version and click “Next.” For most SMB deployments you can select Windows Server 2016/2019 Standard (Desktop Experience).

- **Type of installation (upgrade or custom):** Choose custom installation.
- **Install location:** This window will show two drives that were previously configured in the array controller prior to starting Windows setup, one representing the boot volume and one representing the data volume. Select the boot volume, if in doubt the drive with the smaller total size should represent the boot volume.



- Click on “New,” then either accept the default format size for the new OS volume (recommended), or optionally change the size to a smaller value if you want to partition the volume, and click “Apply.”
- **Administrator password:** After Windows setup completes installing the OS files and reboots the server, you will need to provide a password for the local administrator account.

After providing the administrator password, the server will complete the installation and be ready for initial login and subsequent OS configuration.

Base OS configuration

Once the OS is installed, the server must be configured. A new installation of Windows Server 2016/2019 will start up with the Server Manager Dashboard. Click on “Local Server” in the navigation pane to begin the next steps of the server configuration.

1. **Set the time zone:** Click on the link next to “Time Zone” to go to the time zone settings.
2. **Configure a static IP address:** Click the link next to “Ethernet” to get to the network connections settings and open the interface properties to configure a static IP address per your network requirements.
3. **Rename the server:** Click the link next to “Computer Name” to get the system properties settings, go to the “Computer Name” tab and click “Change” to enter a new name, then provide a new name and click “OK.” The server will need to reboot to apply the change.
4. **Join the server to an Active Directory domain (this is optional and not applicable if no Active Directory domain exists on the network):** After the server reboots from step 3, click the link next to “Workgroup” to open the system properties, then click the computer name tab and click the “Domain” radio button under the “Member of” section. Enter the name of the domain you want to join and, when prompted, enter the logon credentials of a domain user with privileges to add computers to the domain, typically the domain administrator user. Click “OK” until prompted to reboot the server to apply changes, then reboot the server.
5. **Enable remote desktop (optional):** To enable remote administration of the server you can turn on remote desktop by clicking on the link next to “Remote Desktop.” Click the remote tab and select “Allow remote connections to this computer.” If you plan to connect to the server from a computer that is not on the domain, you will need to uncheck the checkbox under this section to allow non-domain computers to connect via remote desktop. It is recommended to only connect using domain computers for additional security.
6. **Automatic updates and security features:** Windows setup turns on Windows Firewall and Windows Defender, and sets updates to automatically download by default, but other settings may be required for your environment. Click on the link next to “Windows Update,” “Windows Defender,” or “Windows Firewall” to go to the configuration window.
7. **Update the server:** Once the initial Windows configurations are set, click Start > Settings > Update & Security > Windows Update, then click “Check for Updates” to download and install all available updates.

ON-PREMISES USE CASES

HPE Small Business Solutions for File and Backup with Microsoft Windows

The HPE Small Business Solution for File and Backup server is equipped with sufficient CPU, memory, and storage resources to enable the server to be used for use cases such as file and print, backup and recovery, and hybrid file and backup.

Once you’ve completed the step in the initial setup section, the server is ready to be deployed into the production environment, and you can begin to configure the necessary Windows roles and features.

File server role

The file server role is added to provide shared network files for users, and a storage location for backups of other systems such as personal computers and other servers.

Deployment planning

Prior to beginning, complete the following steps:

1. Set a static IP address on the server’s network interface that clients will use to access shared folders.
2. If your environment has Microsoft Active Directory Services deployed, join the server to the Microsoft Windows Domain before configuring the file server.
 - a. If Active Directory is planned for the environment but not yet deployed, it is recommended that you deploy Active Directory before all other network services because many services will have integrated features or dependencies on Active Directory. Adding Active Directory after deploying services may have unanticipated consequences and will likely require additional administration.
 - b. If Active Directory is not part of the environment, ensure that the server host name can be resolved by clients using a local DNS server.



3. Prepare a folder-naming and folder-security structure before creating shared folders on the server.
4. Consider if logging security events—such as unauthorized access attempts—is appropriate.

Install the file server role

1. Open the server manager tool if not already open.
2. Launch the “Add Roles and Features” wizard. This can be done from the “Manage” menu of the server administrator.
3. Click “Next” through the “Before you begin” page to the “Select installation type” page, verify “Role-based or feature-based installation” is selected, and click “Next.”
4. On the “Select destination server” page verify this server is selected and click “Next.”
5. On the “Select Server roles” page scroll down to “File and Storage Services” and expand it to select “File Server” then click “Next.”
6. Click “Next” through the “Select Features” page and on the “Confirm installation selections” page. Verify your wizard selections and click “Next” then “Install” to complete the wizard.

Create a shared folder

1. In the server manager dashboard navigation pane, click File and Storage Services > Volumes.
2. On the “Details” pane, click on the volume that will host the new file share.
3. In the “Shares” pane select the “Tasks” drop-down and select “New Share” to open the “New Share” wizard.
4. Select the “SMB Share—Quick” profile and click “Next.”

NOTE

Other settings are available, but this configuration only assumes a simple setup. For details, refer to the [Microsoft Windows Server documentation](#).

5. On the “Select the server and path for this share” page, verify that this server is selected.
6. Verify that “Share Location” is set to “Select by volume.”
7. Select the volume that will host this new share and click “Next.”
8. On the “Specify share name” page enter a name for the new file share (such as “Backups”) and note the share file path and UNC path and click “Next.”
9. On the “Other settings” page accept the default settings and click “Next.”
10. On the “Specify permissions to control access” page note the settings and either click “Next,” or configure additional security settings as needed. These settings can also be configured later, if necessary.

NOTE

- By default, the new share permissions are set to “Everyone group: Allow—Read Only.” This will prevent everyone, including administrators, from saving, making changes to, or deleting any files in the share when remotely accessing the folder over the network. Note that this does not prevent local users from saving to the folder using Windows Explorer or other normal methods.
 - To enable users to save files in the share remotely over the network, you will need to configure “Allow—Change” share permissions for those users.
 - If you do not want to allow read access to everyone, you must first configure the share permissions for specific users or groups and then remove the “Everyone” group.
 - It is **not recommended** to give the “Everyone” group “Allow—Full Control” permissions.
-

11. Review the settings on the “Confirm selections” page and click “Create,” then click “OK” to close the wizard.



Backup server feature

The Microsoft Windows Server Backup feature can be installed for the HPE Small Business Solution for File and Backup server to perform in a backup server role. In this section, we will cover two likely scenarios:

1. The **HPE Small Business Solution for File and Backup** performs a full server backup of itself to an external USB hard drive, such as the HPE RDX Removable Disk Backup System (See the [RDX section](#) for installation procedure).
2. Client machines perform a custom backup of selected files to the **HPE Small Business Solution for File and Backup** via network share.

NOTE

Windows Server Backup can provide basic on-premises backups, or even simple backups to colocation data centers, but has very limited capabilities. If more robust, automated, or centralized backup services are desired, there are many third-party applications that perform these functions. Alternatively, adding Microsoft Azure Backup Service can be an excellent method for server backup to the cloud, which will be discussed in the coming “hybrid cloud use cases” section of this document.

Deployment planning

There are three options to choose from when considering where you will store the backup files from your on-premises server using Windows Server Backup.

1. **Back up to a dedicated disk on the local machine:** This method reserves one entire physical disk on the server strictly for backup data. The disk cannot be part of a RAID array. Alternatively, an external USB drive (such as the HPE RDX Removable Disk Backup System) may be used as the backup target, though there are some external USB drives that are not supported for this operation, so check the Windows Hardware Compatibility List. USB Flash Memory Sticks are not supported for Windows Server Backup.
2. **Back up to a volume:** This method allows backups to be stored on a local volume. The data to be backed up and the volume to store the backup must be on different volumes. You cannot store the backup on the same volume as the data being backed up. This method also puts your data at risk because if the server is down you will not have access to your backups.
3. **Back up to a shared network folder:** This method allows backups to be stored on a shared network folder located on a different machine. This type of backup has a severe limitation of having only the most recent backup available because each backup job overwrites the previous backup job.

NOTE

You can also configure local backup jobs to be stored on the local machine using the shared network folder method if you don't have a dedicated backup disk or the data being backed up to the same volume. However, this plan also puts your backup data at risk by storing it on the same server. You will be able to recover files that have been backed up, but, if the server is down you will not have access to your backups.

If you are using Windows Backup Server, HPE recommends backing up to a dedicated removable USB hard disk such as the HPE RDX Removable Disk Backup System, or to a remote server, or backing up to a cloud storage provider such as Microsoft Azure.

Installing the External RDX Removable Disk Backup System

The RDX Removable Disk Backup System makes performing and complete system backups a snap. Simply schedule a recurring backup job and load a removable disk. Then simply eject the disk after the job is complete and insert a new disk for the next job, allowing you to take your backup copy off-site for greater protection against loss of data. Your Disaster Recovery plan should allow for multiple backup disks to be rotated. Creating your Disaster Recovery plan is beyond the scope of this document since each environment may have several different requirements. But this section of the guide will walk you through setting up the RDX to run with Windows Server Backup.

1. Unpack and connect the RDX to any available USB port with the provided cable. Note that the cable allows for the use of two USB ports on the server if one port does not supply enough power to the RDX unit. (Note: If you do not see the RDX as an available USB drive after installing and inserting a disk, this may mean you do not have enough power available on the single server USB port. Connect the second USB plug on the cable to a second port on the server, or alternatively you can purchase an external power supply for the RDX unit.)
2. Install the RDX Utility, update the firmware, Configure.
 - a. The RDX Utility and Firmware update can be downloaded freely from support.hpe.com
 - b. Run the RDX Utility setup file and step through the wizard, then reboot the server
 - c. Open the RDX Utility and click the “Diagnostic” button
 - d. Click the “Utility” tab, then click the “Change Firmware” button and navigate to and select the downloaded firmware file



3. Configure the RDX System for use with Windows Server Backup.
 - a. Remove disk media if one is installed in the RDX System
 - b. Open the RDX Utility and click the “Diagnostic” button
 - c. Click the “Utility” tab, then click “Change Device Mode”
 - d. Select the “Fixed Disk” option, click OK, then Exit
 - e. Close the RDX Utility
4. Insert an RDX Removable Disk Cartridge and verify that the RDX ready light is solid **green**. Then open Windows Explorer to see that the drive appears in the list of volumes. (Note: Once configured for use with Windows Server Backup the drive will no longer appear in Windows Explorer.)
5. Schedule a Windows Backup job as described in the next section.

Adding the Windows Server Backup feature

To add Windows Server Backup to a remote Windows Server 2016/2019 machine, log on to that machine and perform the following.

1. Launch the “Add Roles and Features” wizard and click “Next” through the “Before you begin” page.
2. On the “Select installation type” page verify that the “Role-based or feature-based installation” option is selected and click “Next.”
3. On the “Select destination server” page verify this server is selected and click “Next.”
4. Click “Next” through the “Select server roles” page.
5. On the “Select Features” page scroll down to select “Windows Server Backup” and click “Next.”
6. On the “Confirm installation selections” page select “Restart the destination server automatically if required,” confirm that “Windows Server Backup” is being installed and click “Install.”
7. Once the install wizard is complete, close the wizard.

Schedule a full-server backup job using an external USB disk drive

Backing up to an external disk provides the opportunity to rotate a set of external disks for safekeeping off-premises. To enable multi-disk capability, you must schedule the first backup job, then open the backup schedule and modify the backup job to add storage disks to the backup disk library.

NOTE

The external USB device must be an HDD or SSD, not a flash memory stick. The disk will be formatted and all data on the disk will be lost. Windows Server Backup will not recognize the disk if there is an operating system installed on it; manually remove all partitions on the disk using the Disk Management MMC or other tool if necessary.

Scheduling the first backup job:

1. On the “Server Manager” click Tools > Windows Server Backup to open the backup console.
2. Click “Local Backup” in the navigation pane.
3. Click “Backup Schedule” in the “Actions” pane.
4. On the “Getting Started” pane click “Next.”
5. Select “Full server” and click “Next.”
6. Schedule a time for the backup to occur and click “Next.”
7. Select “Backup to a hard disk that is dedicated for backups” and click “Next.”
8. Ensure the external USB connected disk (such as the RDX Removable Disk Backup System) is selected and click Next, then acknowledge the warning regarding the external disk, and monitor the wizard as it formats the new disk.
9. Review the “Confirmation page” settings and click “Finish.”
10. Monitor the wizard completion of the process and click “Close.”



Adding backup disks

To add backup disks, you must modify the backup schedule.

NOTE

It is recommended to physically mark the external disk with the volume identification in the Windows Server Backup tool when using multiple external disks in a rotation. When you want to restore data, you will need to know which external disk to restore from.

1. Change to a new external USB drive (or load a new RDX Disk Cartridge) for storing backups.
2. On the “Server Manager” click Tools > Windows Server Backup to open the backup console.
3. Click “Local Backup” in the navigation pane.
4. Click “Backup Schedule” in the “Actions” pane.
5. On the “Modify Scheduled Backup Settings” page select “Modify backup” and click “Next.”
6. On the “Select Backup Configuration” page select “Full server” and click “Next.”
7. On the “Specify Destination Type” select “Backup to a hard disk that is dedicated for backups” and click “Next.”
8. On the “Keep or Change Backup Destinations” page, select “Add more backup destinations,” and click “Next.”
9. On the “Select Destination Disk” page, ensure the new external USB disk (or new RDX Backup System Disk Cartridge) is selected and click “Next,” then acknowledge the warning regarding the external disk (if presented), and monitor the wizard as it formats the new disk.

Schedule a backup job using a shared network folder

Backing up remote hosts (Client servers or user PCs) to a shared network folder requires that the target folder already exists. Then you can select it as the target for a remote host’s backup jobs.

NOTE

When performing backup of remote hosts to the HPE Small Business Solution for File and Backup server, it is recommended to configure and use a “Service Account” and assign that account only enough privileges to perform the backup task. Create a backup “Service Account”—either on the remote machine or in Active Directory—that will be given backup privilege on the remote host and have permission to write to the shared folder on the target HPE Small Business Solution for File and Backup server. Service accounts and share and folder permissions are controlled by your organization’s security policy, and are outside of the scope of this document. Refer to your company’s security policies and [Microsoft documentation](#) for guidance.

To create the target folder for remote backups, refer to the previous section “[Create a shared folder](#)” for instructions on creating a shared network folder, but with the following exceptions:

1. Give the folder a name like “Backups” or “Desktop Backups” that identifies what the folder is used for.
2. Create the network share and give it the same as the folder name. This folder should only be used for backups. As remote machines backup to this folder using Windows Server Backup, they will create sub-folders that start with the remote machine’s NetBIOS name.
3. Make sure to set the share and folder permissions for the service account that will be used to perform the backup. The credentials of this service account will be required when you set up the backup job on the remote host.

To schedule a backup job on the remote Windows Server 2016/2019 machine:

1. On the “Server Manager” click Tools > Windows Server Backup to open the backup console.
2. In the navigation pane, click “Local Backup,” then on the actions pane click “Backup Schedule” to open the Backup Schedule wizard.
3. On the “Getting started” page observe the choices available and click “Next.”
4. On the “Select Backup Configuration” page select either “Full server” or “Custom” and click “Next.” Note that for this example we will use the custom selection and backup select folder(s).
5. On the “Select Items for Backup” page click “Add Items.”
6. Select the desired folders to be backed up and click “OK” and “Next.”
7. On the “Specify Backup Time” page choose the desired backup time and click “Next.”



8. On the “Specify Destination Type” page select “Backup to a shared network folder” and click “Next” and acknowledge the warning that backup jobs will be overwritten.
9. On the “Specify Remote Shared Folder” page:
 - a. Enter the UNC path (example \\myserver\backups) of the network share that will store the backup.
 - b. Select the desired access control method and click “Next.”
 - c. Provide credentials for the remote shared folder if prompted.
10. Review the “Confirmation” page and click “Finish” and close the wizard.

Reviewing backup jobs

You can review the scheduled backup task in “Task Scheduler” by opening the server manager and clicking Tools > Task Scheduler, then navigate through the task list by clicking Task Scheduler Library > Microsoft > Windows > Backup. Here you can see the status and history of backup jobs, as well as change some settings or even run the scheduled job manually.

Testing the backup with a recovery job

Recovering from a disaster depends on being able to access and recover files from the backups, whether there is a catastrophic loss of the server or there is a much smaller micro-disaster, such as recovering a corrupted file. Performing periodic test recoveries of your backups is essential for knowing that you can recover data in a real crisis. Testing recovery of backups also builds your skill confidence and will greatly improve your recovery performance when under the pressure of a real disaster. You should perform full server and simple file/folder test recoveries periodically.

NOTE

A full server test recovery is very complex and could negatively impact your production environment. It should always be done in an environment isolated from your production environment. Full server recovery is outside of the scope of this document.

To recover files previously backed up to a remote server using Windows Server Backup:

1. On the “Server Manager” click Tools > Windows Server Backup to open the Windows Server Backup console.
2. In the navigation pane, click “Local Backup,” then on the actions pane click “Recover” to open the Recovery wizard.
3. On the “Getting Started” page select “A backup stored on another location” and click “Next.”
4. On the “Specify Location Type” page select “Remote shared folder” and click “Next.”
5. On the “Specify Remote Folder” page enter the UNC path of the remote folder that contains the backup file that has the files to be recovered and click “Next.”
6. On the “Select Backup Date” page select the date and time (if necessary) of the backup job that has the files to be recovered and click “Next.”
7. On the “Select Recovery Type” page select “Files and folders” and click “Next.”
8. On the “Select Items to Recover” page browse the folder tree in the “Available items” pane and click on the file or folder to be recovered. Ensure that it appears in the “Items to recover” pane and click “Next.”
9. On the “Specify Recovery Options” page specify the recovery location, file overwrite options, and security settings options as desired (for example, for a test recovery you could specify a “Test Recovery” folder) and click “Next.”
10. On the “Confirmation” page review the job properties and click “Recover.”
11. Check the target location of the recovery job and verify the file was recovered. If possible, verify the file is not corrupted.

HPE Small Business Solution for Virtualization with Microsoft Windows

The HPE Small Business Solution for Virtualization server is equipped with sufficient CPU, memory, and storage resources to enable the server to host multiple virtual machines (VMs). Because they are based on Microsoft Windows, they also integrate seamlessly with many Microsoft Azure services, thus providing an agile and efficient hybrid cloud virtualization solution.

Once the server is ready to be deployed into the production environment (refer to the chapter “[Initial Setup](#)” in this document) you can begin to configure the necessary Windows roles and features to support Microsoft Hyper-V virtualization.



Installing and configuring virtualization using the Microsoft Windows Server Hyper-V role

The Windows Server Hyper-V role provides virtualization services to host multiple Windows- and Linux®-based VMs from a single physical server. This enables you to fully utilize the server investment and consolidate older servers, while segregating critical applications and infrastructure services to prevent one failing app or service from taking down the entire IT infrastructure.

Deployment planning

Prior to beginning, complete the following steps:

1. Set a static IP address on the network interface of the Hyper-V host.
2. Ensure that the server host name can be resolved by clients using a local DNS server.
3. Joining the Hyper-V host server to a local Active Directory Domain is not required, and in some cases it is undesirable. However, managing the server may be easier if the server is a domain member due to ease of administration and server management automation that is available in an Active Directory environment.

It is recommended to:

- a. Join the domain if the server is only accessible on the private network. Join the server to the domain before configuring the Hyper-V role if your environment has Microsoft Active Directory Services deployed.
 - b. Not join the domain if the server is or will be accessible from outside of the private network, such as when it is placed in the DMZ to host VMs that will be exposed to the internet (like web servers, for example).
4. Plan for where to store the files used by Hyper-V VMs. A typical scheme would be to set up a folder on a high-performance storage volume that is separate from the OS volume. HPE Small Business Solutions for Virtualization provide for this scenario.
 5. Have your OS media ready. The recommended method is to store OS files in a designated folder on the host server.
 6. Install the VM's OS from a physical device such as a CD/DVD-ROM, from a floppy disk image (VFD file, or a virtual boot floppy disk), an .iso file that is accessible through a network share or stored on the local host server, or from a network-based installation server. The last option will install a legacy network adapter to your VM so you can boot from the network adapter.

Install the Hyper-V server role

1. Open Server Manager.
2. In the "Server Manager" menu click Manage > Add Roles and Features.
3. At the "Select Installation Type" page, choose the role-based and click "Next."
4. On the "Select Destination Server" screen, verify your server is selected and click "Next."
5. On the "Select Server Roles" screen, click the "Hyper-V" check box. When the "Add Features" dialog box appears, accept the defaults and click the "Add Features" button, then click "Next."
6. At the "Select Features" screen, click "Next."
7. At the "Hyper-V introduction" screen, click "Next."
8. At the "Create Virtual Switches" screen, choose the appropriate network adapter and click "Next."
 - a. At least one network adapter must be installed, connected to the network, and active in order to configure a virtual switch. If no adapters are shown, check to ensure that there is at least one adapter connected to the network. You can choose to configure a virtual switch later.
 - b. If multiple physical adapters are installed on the host server and they are connected to the network, you will be presented with a choice of network adapters.
 - I. You may want to create multiple switches, for example, one for the connection to the LAN, and one to the DMZ. Select the one you want to configure now and go back later and add the second virtual switch and bind it to the other adapter.
 - II. You may only want to use one of the adapters for VM connectivity. In this case, choose one and continue.
9. At the "Virtual Machine Migration" screen, click "Next." Note that, while it is possible to configure this new Hyper-V server to migrate VMs to/from other Hyper-V servers, VM migration is outside of the scope of this guide. Please refer to [Microsoft documentation](#).
10. At the "Default Stores" screen, browse to the folder location where you want to put the VM files by default. For HPE Small Business Solutions for Virtualization we recommend:
 - a. Location for the virtual hard disk (.vhdx or .vhd) files—D:\Hyper-V\Virtual Hard Disks
 - b. Location for the VM settings files—D:\Hyper-V
 - c. Click "Next" to continue.



11. At the “Confirmation” screen, click the “Install” button.
12. After the installation is complete, click the “Close” button.
13. Restart your server.

Configure Hyper-V and add VMs

After you have installed the Hyper-V role, you can configure the settings of the Hyper-V server and begin adding VMs. The Hyper-V Manager is the tool used to perform these tasks. You can access the Hyper-V Manager by one of the following methods.

1. From the “Server Manager” menu click Tools > Hyper-V Manager.
2. From the Server Manager navigation pane, click “Hyper-V” then right click the server in the “Servers” pane, then click “Hyper-V Manager.”
3. From the Hyper-V manager you can configure default and global settings as well as virtual switches to enable VMs to communicate with the physical network.
4. By default, Hyper-V is ready to begin installing and hosting VMs. But there are some instances where you may want to adjust these settings to better fit your operating environment. You can find more information about Hyper-V configuration at docs.microsoft.com/en-us/windows-server/virtualization/hyper-v/hyper-v-on-windows-server.

To create VMs:

1. In the “Hyper-V Manager” window right click the server in the navigation pane and either select New > Virtual Machine, or select the server and click New > Virtual Machine in the “Actions” pane.
2. In the “New Virtual Machine Wizard,” click “Next” on the “Before You Begin” page.
3. On the “Specify Name and Location” page, give your VM a name, and, if desired, change the default location of the VM configuration files. Click “Next” to continue.
4. The “Specify Generation” screen is next. Choose “Generation 2” (“Generation 1” should only be used if necessary for application compatibility, refer to your application guidance), and click “Next.”
5. On the “Assign Memory” page define how much of your host system’s memory you want to assign to this VM. You can also choose to allow the VM to start with only the memory that it needs and then “Dynamically Expand” up to the value you set here when it needs more.
6. Remember that once all of your VMs use up all of your host’s physical memory, it will start swapping to disk, thus reducing the performance of all VMs. Click “Next” to continue.
7. On the “Configure Networking” page, select the virtual switch that you previously configured during Hyper-V role installation, or another virtual switch if a different one was created and desired for this VM. Click “Next” to continue.
8. On the “Connect Virtual Hard Disk” page, select “Create a virtual hard disk” and provide a name, location, and size for the virtual hard disk. Click “Next” to continue.
9. If you are following the previously recommended, you would store the .vhdx in D:\Hyper-V\Virtual Hard Disks. You might also consider adding one more sub-folder that is the same as the VM name to keep .vhdx files from different VMs separated. Name the .vhdx file so that it describes the function of the disk (i.e., D:\Hyper-V\Virtual Hard Disks\NewVM\NewVM_BootVolume.vhdx, or .vhd if the disk is a Generation 1).
10. It is possible to create dynamically expanding, differencing, physical, or fixed virtual hard disks, but you can create only a dynamically expanding virtual disk on this page. You will have to create other types of disks individually at the Hyper-V Manager by selecting New > Hard Disk.
11. On the “Installation Options” page you can select how you want to install your OS. The fastest method is to store an .iso file on the host server file system and point the installation wizard to that file.
12. If you followed the recommendations, choose “Install an operating system from a bootable .iso file” and browse to the file and select it. Then click “Next.”
13. On the “Completing the New Virtual Machine Wizard” summary page, verify that all settings are correct. You also have the option to start the VM immediately after creation. Click “Next” to create the VM.
14. Start the VM. It will boot to the selected .iso file then begin the installation of the OS.
15. Repeat these steps for each VM you want to deploy on your Hyper-V server.



HPE Small Business Solutions for High Availability Storage with Microsoft Storage Spaces Direct

The HPE Small Business Solution for High Availability Storage with Microsoft Storage Spaces Direct is the easiest and most cost-effective way to setup an on-premises hyperconverged infrastructure (HCI) with integrated software-defined storage (SDS). It enables you to create a Storage Spaces Direct cluster with as few as two servers and expand the cluster as your capacity needs grow by simply adding more servers to the cluster, with no downtime. The SDS redundancy provided by Microsoft Storage Spaces Direct combined with the reliability of HPE fault tolerance, high availability, and resiliency features work together to create a resilient Hyper-V virtualized environment with cluster-shared storage. In addition, the deduplication feature available on Windows Server 2019 Storage Spaces Direct provides improved write performance and optimized capacity utilization.

NOTE

Microsoft Storage Spaces Direct is the SDS technology built into Microsoft Windows Server 2016 and 2019 Datacenter versions. The Microsoft Windows Server Software-Defined (WSSD) program for Windows Server 2016 and Azure Stack HCI for Windows Server 2019 are Microsoft marketing and validation programs built around Storage Spaces Direct to offer specific Storage Spaces Direct based configurations to customers. The configurations approved by Azure Stack HCI program for Windows Server 2019 and the WSSD program for Windows Server 2016 have gone through Microsoft approved testing cycles in the vendor's lab. See [HPE Solutions for Microsoft Azure Stack HCI](#) for the current list of validated configurations.

NOTE

The setup used in this deployment guide is a Microsoft Storage Spaces Direct configuration. In the future, the configuration used in the document may be approved by the Azure Stack HCI program. However, the deployment steps captured in this document remain the same in general for an Azure Stack HCI configuration. See [HPE Solutions for Microsoft Azure Stack HCI](#) for the current list of validated configurations.

The following setup instructions are based on HPE ProLiant DL360 Gen10 Servers but can also be applied to the other High Availability configurations with HPE ProLiant ML350 Gen10, DL380 Gen10, and DL385 Gen10 Servers.

This document was created using 2 ProLiant DL360 nodes to create a 2 node Storage Spaces Direct cluster using Windows Server 2019 Datacenter. Each of the DL360 in the cluster had the following components:

- 1 x Intel® Xeon® Silver 4110 CPU (8 cores) @ 2.10 GHz
- 64 GB RAM
- 4 x 1.2 TB SFF 10K SAS drives
- 2 x 480 GB SFF SATA SSD drives
- 2 x 240 GB SATA MU M.2 SSD (Mirrored OS drives)
- HPE Universal SATA HH M.2 Kit
- HPE Smart Array E208i-p storage controller
- Ethernet 10/25 GB 2-Port 640FLR-SFP28 Adapter

Set up the HPE ProLiant DL360 Gen10 servers

1. Install the 4 x 16 GB RAM in the memory slots as per the [HPE DIMM installation guide](#).
2. Remove the disk drive covers from the front of the server and install the 4 x 1.2 TB SFF 10K SAS drives and the 2 x 480 GB SFF SATA SSD drives.
3. Remove the server top cover panel and raise the PCIe cage; set it aside.
4. Install the Ethernet 10/25 GB 2-port adapter in the slot that can be seen below after removing the PCIe cage. You will need to remove the metal cover from the 2-port slot opening in the back of the server, which is secured with a screw, before installing the Ethernet adapter.

NOTE

The HPE Small Business Solution for High Availability Storage comes with the P408i-p Smart Array controller. If no P408i-p controller is available, the E208i-p is a lower cost option.



5. Install the Smart Array controller in Slot 1 of the PCIe cage. You can install it in Slot 2 of the cage as well, but it may require a longer SAS cable to connect the drives from the front of the server to the 2-ports of the controller.
6. Connect the SAS cables from the disk drives at the front of the server to the controller, Port 1 to Port 1 and Port 2 to Port 2.
7. Install the 2 x 240 GB M.2 SATA SSD drives in the universal SATA M.2 kit. You will need to remove the screw to install the drive and replace the screw after installing the drive to secure it.
8. Install the universal M.2 kit in Slot 2 (or Slot 1 if Slot 2 was used for Smart Array controller in Step 5 above) of the PCIe cage. If installing on Slot 2, you will need to switch the metal rail on the M.2 kit to the supplied smaller rail so that it can install on the PCIe cage.
9. Connect the two SATA cables from the M.2 kit to the SATA ports on the motherboard.
10. Replace the PCIe cage and secure it until it latches.
11. Replace the server top cover panel and secure it.
12. Mount the server to the rack using the easy install rails supplied.

Prepare the servers for Windows 2019 installation

After both servers are mounted on the rack, perform these steps:

NOTE

This “direct-connect” configuration is for a 2-node solution. If more than two servers are used in the Storage Spaces Direct, please refer to Microsoft documentation listed on [page 32](#).

1. Cross-connect the two servers using the SFP cable. Connect Port 1 on the Ethernet 10/25 GB adapter on Server 1 to the Port 2 on the Ethernet 10/25 GB adapter on Server 2. Similarly, connect Port 2 on Server 1 to Port 1 on Server 1.
2. Connect the iLO 1 GB Ethernet ports on Server 1 and Server 2 to the top of rack (ToR) switch.
3. Connect any one of the 4 x 1 GB Ethernet ports to the ToR switch for both servers.
4. Connect the dual power supply unit for each server to the power outlet, two power cables per server.
5. Power on the servers.
6. By default, the iLO DNS name, User name (Administrator) and Password printed on the top of the server for both servers.
7. From your remote access device, point the browser to the https://<iLO_DNS_Name> and supply the iLO administrator/password to login to each server.
8. Install the iLO license key in the iLO license key section.

NOTE

Without the iLO license key, the remote session to the server will get disconnected after a minimal timeout.

9. Register the server with HPE per the iLO instructions, using your HPE passport credentials.
10. Ensure that the health of both the servers is **green** on the iLO pages.

NOTE

At times, the server health may report as “Degraded” with a warning symbol on the iLO page. Please refer to the [Update firmware and drivers](#) section of this document for more details on a possible fix.



Install Windows Server 2019

Windows Server 2019 can be installed on the M.2 SSDs of both the servers in the following way:

1. Acquire the Windows Server 2019 ISO image and the license code.
2. Create a bootable USB stick with the ISO image on your laptop.

NOTE

HPE recommends using [Rufus software](#) to create the image. Bootable USB sticks created from other software products caused the installation to fail or hang in the middle of the process.

NOTE

While installing Windows, disable secure boot in the server BIOS. You can turn secure boot back on after the OS is installed on the primary M.2 boot disk.

3. Insert the bootable USB sticks into the servers and reboot them from USB. This will start the OS installation on the server. This can be performed and monitored from a remote session to the iLO webpage of the servers.
4. Go through the Windows Server 2019 installation wizard, supply the license code, and start the installation.
5. You have the option to select either the Datacenter Edition or the Datacenter Desktop Experience Edition. Install the Datacenter edition if you are comfortable working with PowerShell and scripting. Install Datacenter with Desktop Experience Edition if you would like to use a graphical user interface (GUI). Note that the Datacenter Desktop Edition will take more storage space on the servers than the Datacenter Edition. Datacenter Desktop was used in this installation.
6. Choose the first M.2 SSD SATA drive that appears in the list of drives on the installation wizard.

NOTE

There are two M.2 SSD SATA drives in this configuration, which should be configured in RAID 1 so that one M.2 SSD drive is a mirror of the other drive. This RAID 1 configuration can be performed later, after the OS is installed, using the Windows RAID mechanism in the Windows Disk Configuration Utility. Refer to the [Set up a RAID 1 mirror for the M.2 Boot drive](#) section of this document for directions.

7. Once the installation is complete, the server will reboot and prompt you to set the Administrator password. Set the password and login to Windows Server 2019.

Upgrade the HPE Smart Array Controller drivers

The Smart Array Controller's driver must be updated on Windows Server 2019. If the Smart Array Controller driver is not updated, you will receive an error message:

Component details

Component cp037175

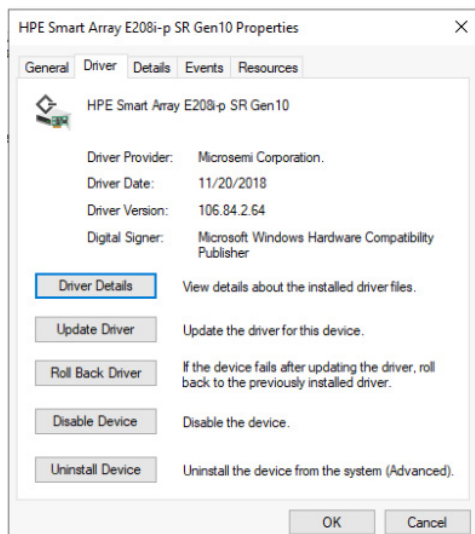
Failed dependency details

HPE Smart Array Gen10 Controller Driver version 63.32.0.64 or greater is required and should be already active for firmware update. Update the driver and reboot before attempting firmware update.

Close



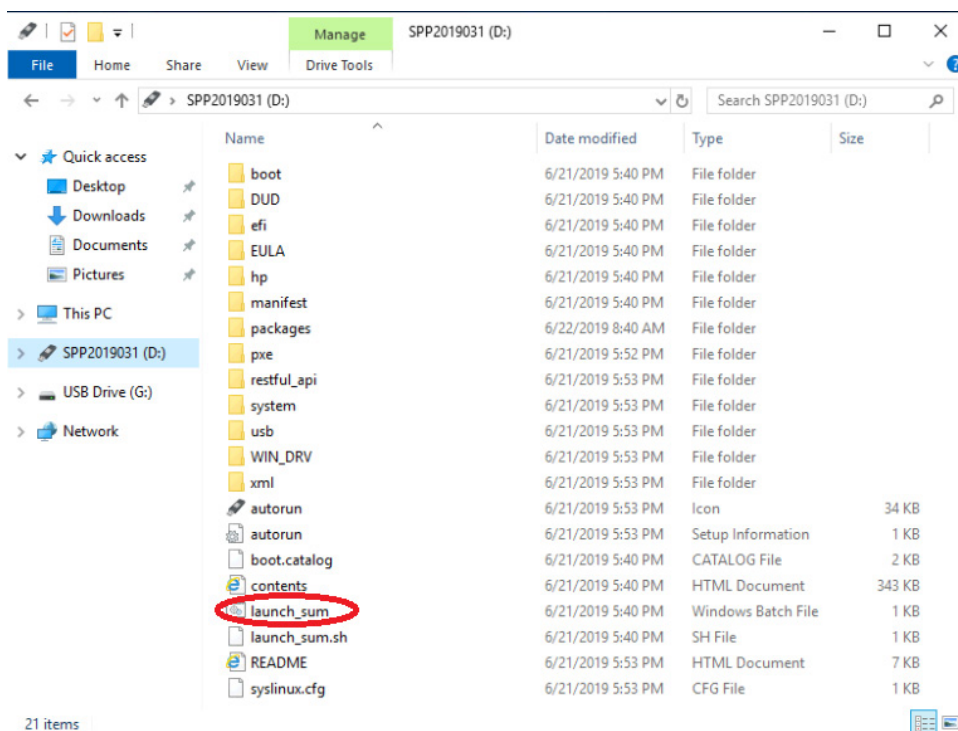
1. Install the latest Windows Server 2019 driver controllers from the [HPE Support Center](#).
2. After performing the driver update, the driver version can be double-checked as below:



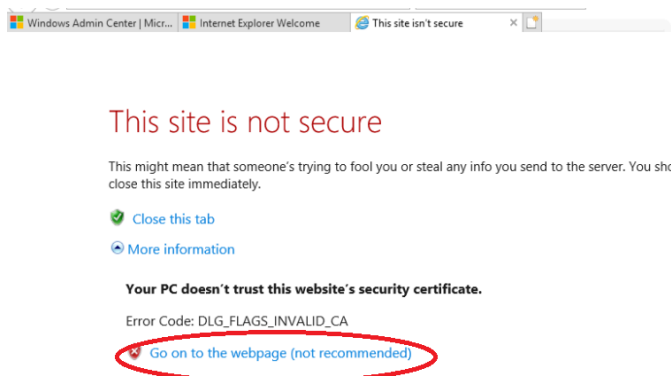
Update server firmware and drivers

After logging in to Windows Server 2019 on both servers, it is important to update the servers' firmware and Windows Server drivers. This is required for the successful installation of the Windows Server components necessary to deploy Storage Spaces Direct and to fix any degraded levels in the iLO health monitor on the servers.

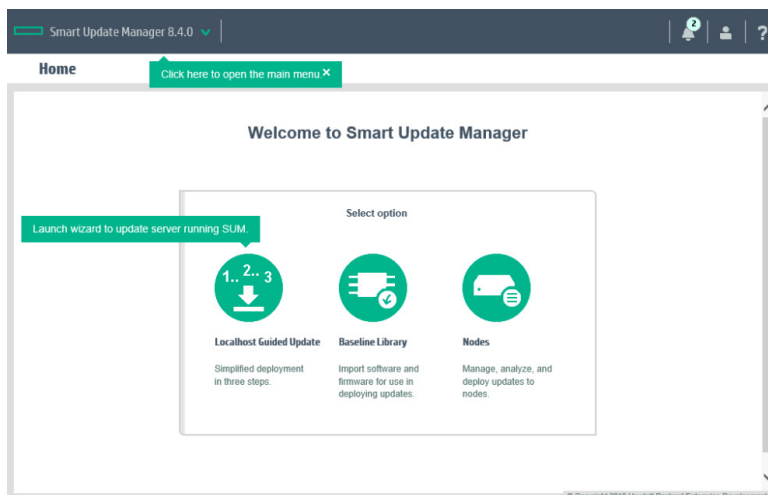
1. Download the [HPE Service Pack for ProLiant \(SPP\) ISO image](#).
2. Create a bootable USB stick as described earlier in this document.
3. Insert the USB stick into the servers and navigate to the USB drive in the File Explorer.
4. Run the launch_sum.bat file from the USB drive on the Windows Server 2019 desktop.



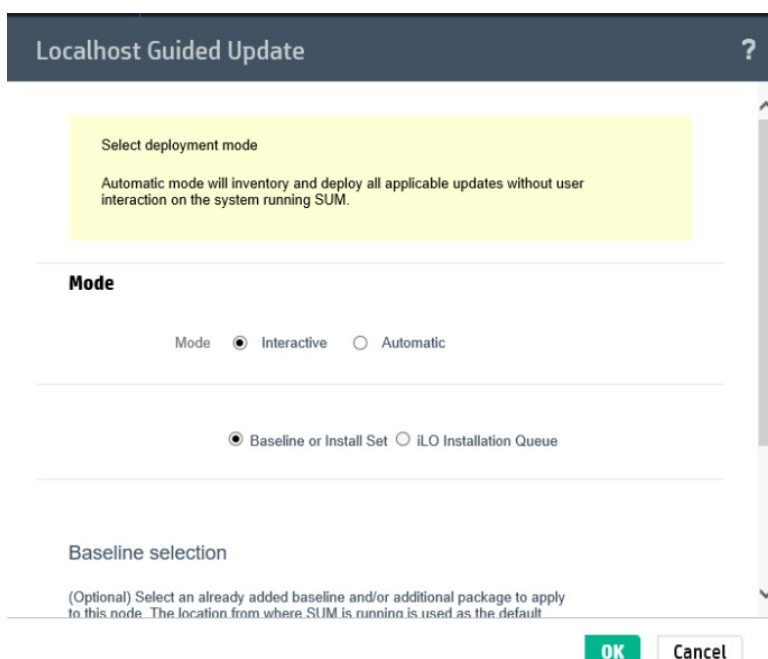
5. This will launch the HPE SUM web-based UI in the default browser on the Windows Server 2019 desktop. Accept the insecure server side certificate (as the root certificates aren't installed and configured yet) and proceed to the SUM page.



6. From the SUM UI, choose "Localhost Guided Update."



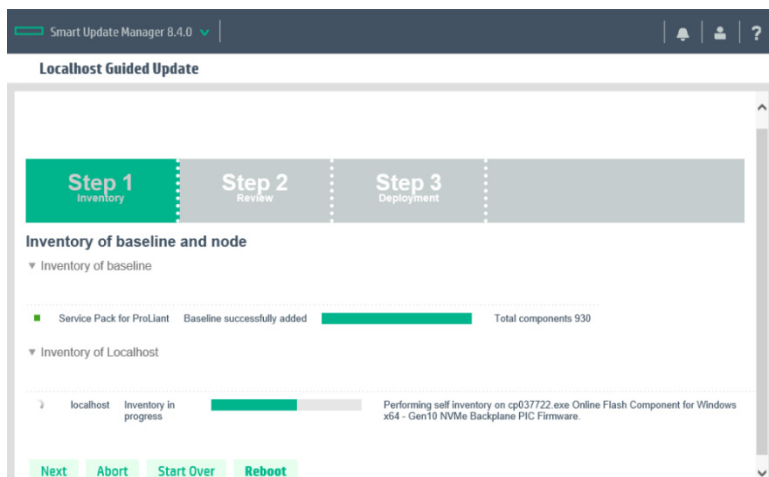
7. Choose "Interactive" mode, "Baseline or Install Set" for the SUM firmware update as shown below. Note that Automatic mode can also be selected, however, interactive mode was used for this documentation. Click "OK" to continue.



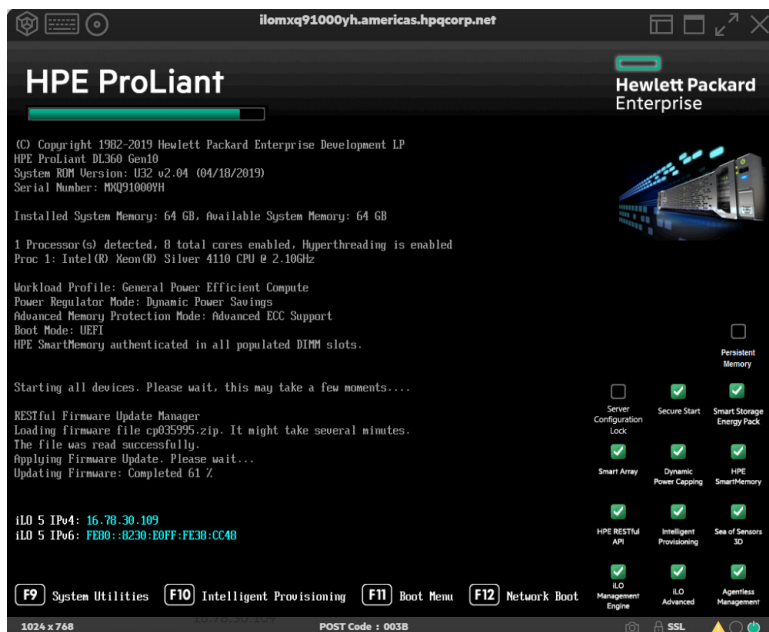
8. This will start the baselining and inventory building processes. Once completed, SUM will list the components to be updated. Review and accept them to start the firmware update.

NOTE

During the firmware update, the remote session to the server via the iLO will disconnect briefly, which is normal.



9. Once the firmware is updated successfully, reboot the server by clicking on the “Reboot” button on the SUM page. The firmware will update during the reboot, as shown below.



Configure the HPE Smart Array Controller to operate in HBA mode

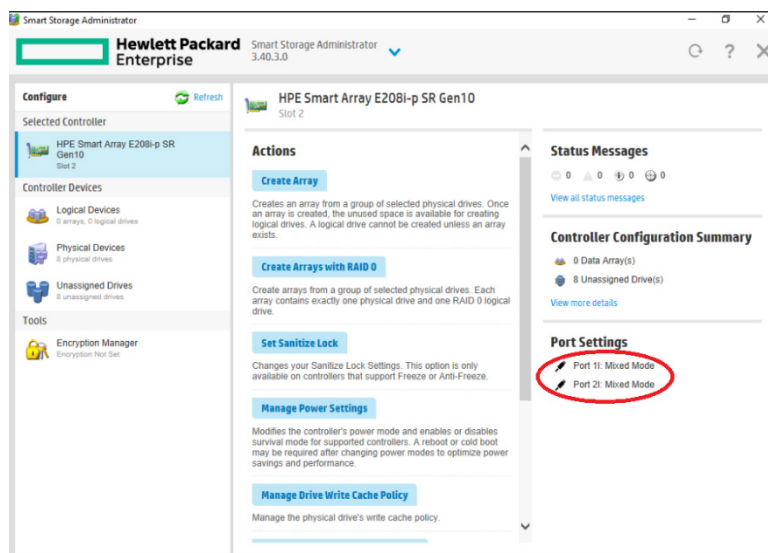
The HPE Smart Array Controller is set by default to operate in Mixed Mode, where the raw drives attached to the servers can be presented directly to the OS as raw drives in HBA mode or can be presented as hardware-controlled RAID drives in RAID mode. For Storage Spaces Direct, the drives must be presented to the servers in HBA mode.



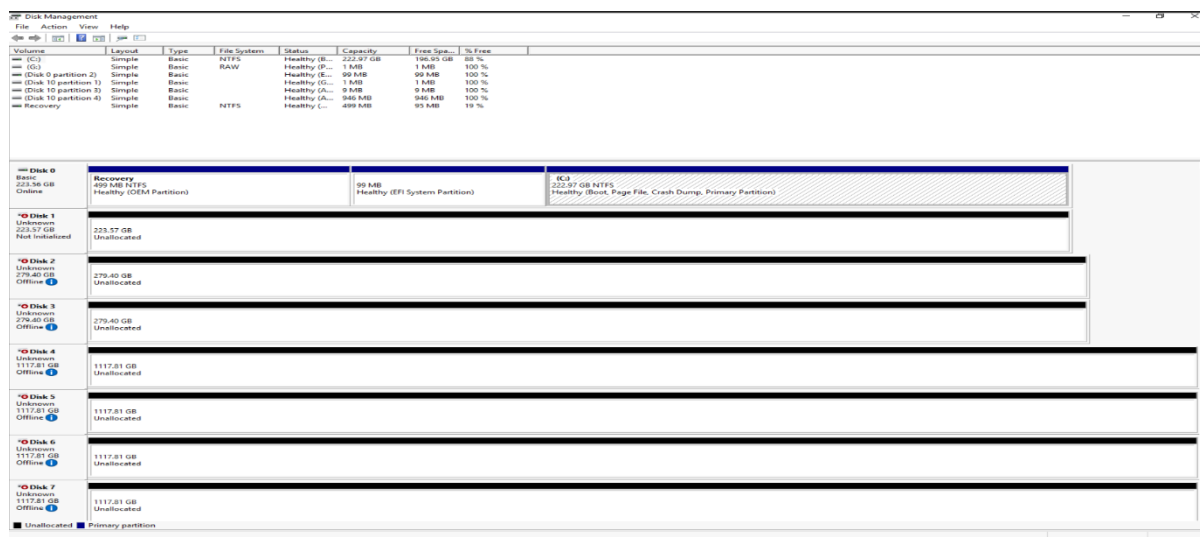
1. Download the [HPE Smart Storage Administrator \(SSA\)](#).



2. Open the HPE SSA. Confirm that the Smart Array Controller to which the Storage Spaces Direct drives are connected via SAS cable are set to operate in Mixed Mode, as shown in the screenshot below:



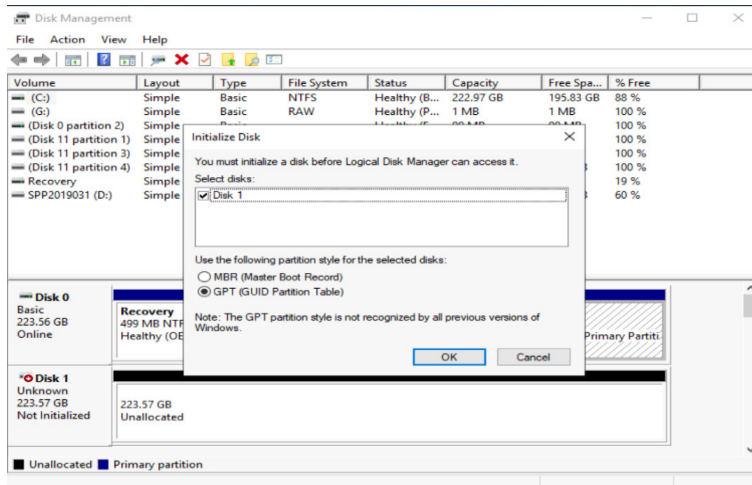
3. With the proper configuration of the controller, the OS will show the raw drives as below:



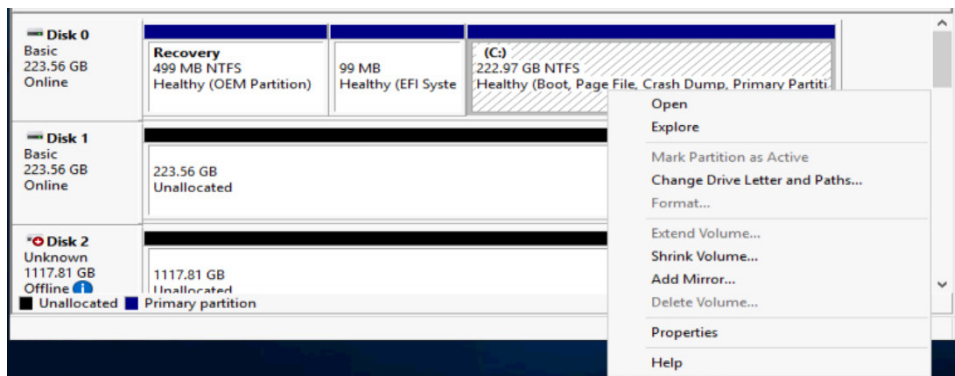
Set up a RAID 1 mirror for the M.2 Boot drive

The M.2 SATA SSD drives must be configured as RAID 1 mirror drives so that the Windows Server 2019 boot drive can be protected against a single M.2 drive failure. Perform the following steps on both servers.

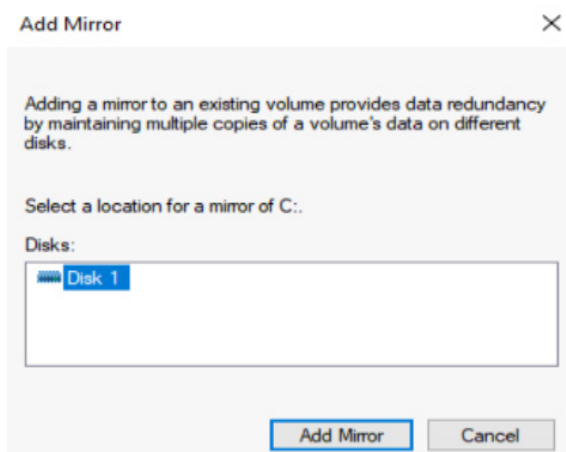
1. Open the Disk Management utility in Windows Server 2019.
2. Locate the second M.2 SATA SSD drive (on which there is nothing installed) and initialize the disk as a GPT disk.



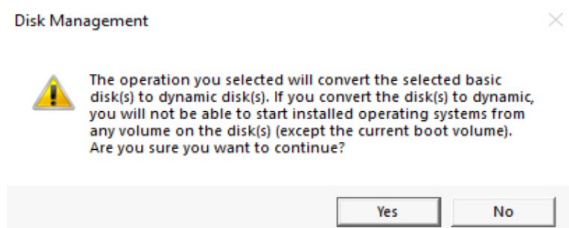
3. Locate the M.2 SATA SSD drive on which the Windows Server 2019 is installed and right click on it to locate the “Add Mirror” option as shown below:



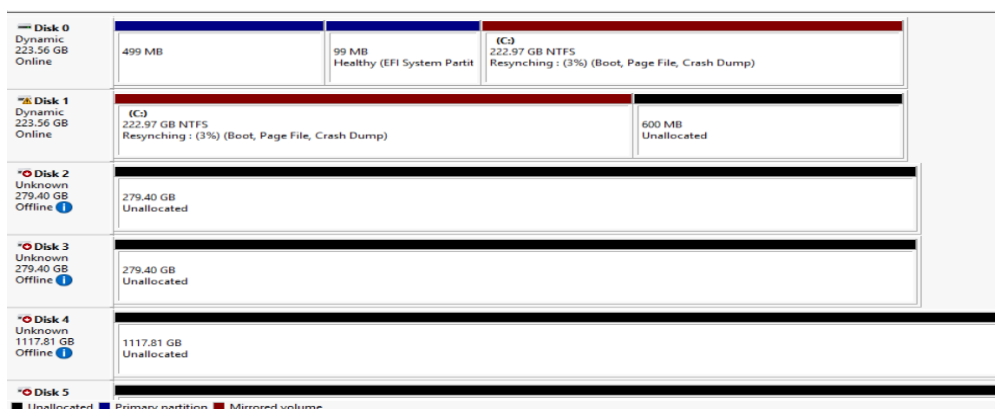
4. Select “Add Mirror” and choose the second M.2 SSD drive as the mirror destination.



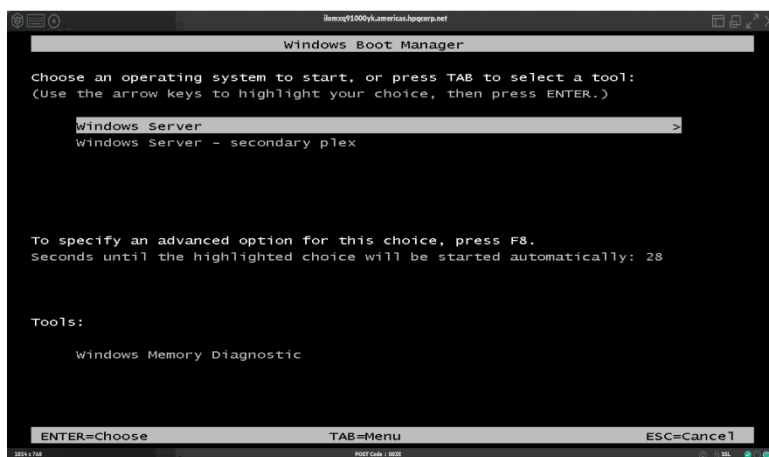
5. Click “OK.” You will see a warning message as below. Accept the message and proceed.



6. This will begin the process of synching the drives so that the current M.2 boot drive and the second M.2 drive become a mirror of each other.



7. Once the sync is complete, subsequent reboots of the server will start showing two options for boot as shown below, which indicates that the configuration is correct.



Install and configure Active Directory and DNS

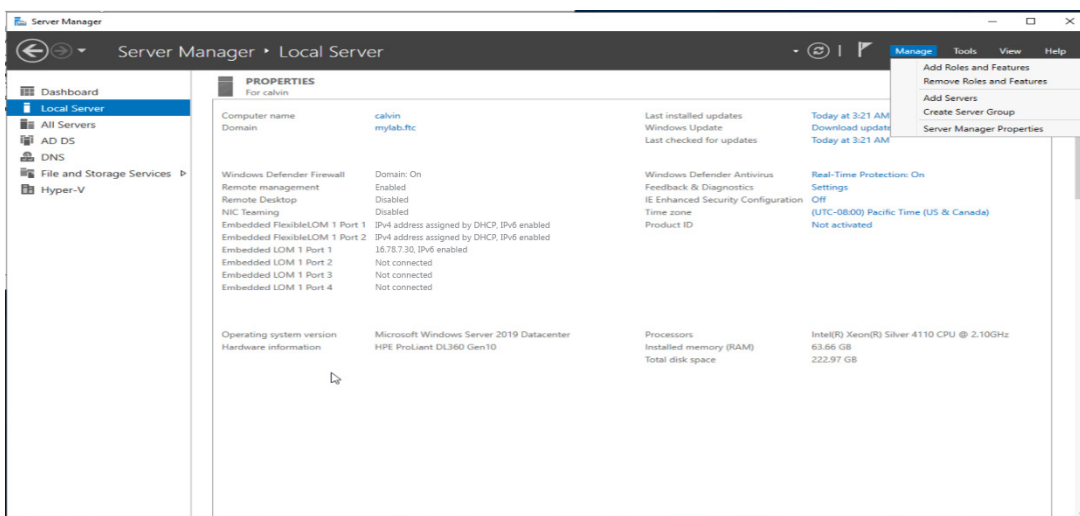
The servers in the Storage Spaces Direct cluster need to be joined to the same Active Directory domain. Also, the Active Directory domain user name that is used to login to the Storage Spaces Direct cluster servers should be added to the server's Windows Server 2019 local Administrator group. For example, if the servers are joined to the Active Directory domain "mylab.ftc" and if the domain user called administrator@mylab.ftc is used to administer the servers then administrator@mylab.ftc needs to be added to the localhost\Administrator account group on those servers.

NOTE

Do not promote one of the Storage Spaces Direct servers as a Domain Controller. Storage Spaces Direct is not supported on Domain Controller nodes. This means a separate Domain Controller Windows system is required to provide the Active Directory domain services. If there is no existing Active Directory Domain Controller, then refer to the "Install and Configure Active Directory and DNS" section of this Deployment Guide.



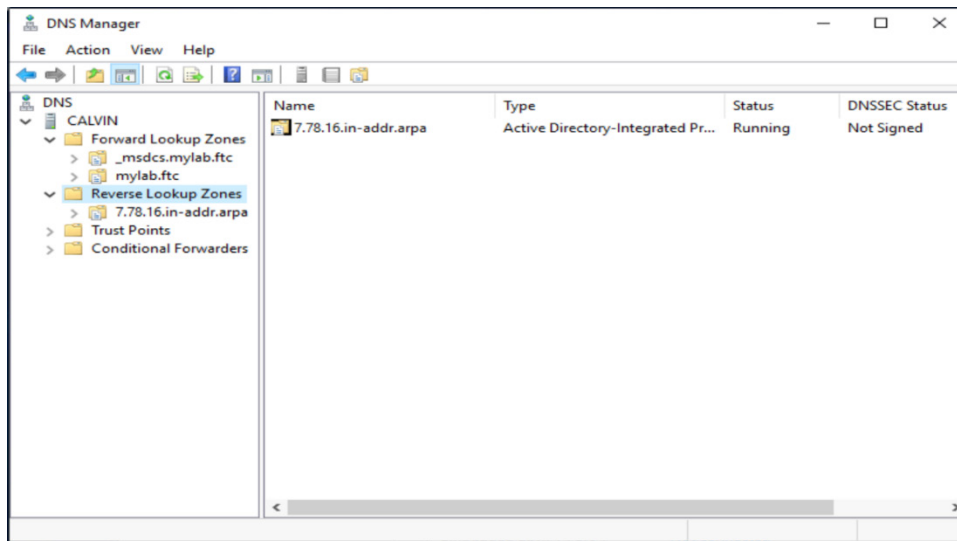
1. Identify a separate server that can act as the Active Directory Domain Controller. **Do not** use one of the HPE Small Business Solutions for High Availability Storage with Microsoft Storage Spaces Direct cluster nodes.
2. Install Windows Server 2019 as described earlier in this document.
3. Configure a static IP address for the server:
 - a. Go to Server Manager → 1 GB Ethernet Adapter → Properties → TCP/IP IPv4 → Properties → Use Static IP address.
 - b. Set the static IP, Subnet Mask, Default Gateway, and DNS servers.
4. Install the Active Directory and DNS services on the designated Active Directory Domain Controller server.
 - c. Go to Server Manager → Manage → Add Roles and Features → Role Based or feature based installation.
 - d. Select the local server and check the box for “Active Directory Domain Services” and “DNS Server.”
 - e. Click on “Add Features.”



5. Click “Next” repeatedly, accepting the default selections, and start the install.
6. Once the installation is complete, click on the “Promote this server to a domain controller” link that appears at the end of the installation. This will promote the computer as domain controller for the chosen domain.
7. Accept the defaults and click “Next” until the promotion starts.
8. The server will automatically restart after the promotion is complete.
9. After the reboot you will see the login as <domain_name>\Administrator where <domain_name> is the domain name you chose.
10. After reboot go to Server Manager → Tools → DNS → Expand Server.



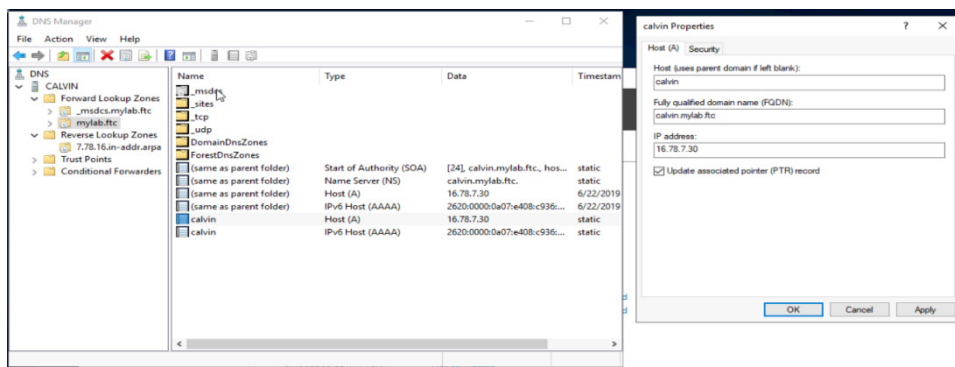
11. Right click on “Reverse Lookup Zones” and click “New Zone.”



12. Click “Next” repeatedly to accept defaults. When you reach the Network ID input section, enter the first three octets of the server’s IP address.

13. Click “Next” to accept the defaults and click “Finish.”

14. Ensure that the DNS PTR record is updated as shown below:



15. Set the preferred DNS of the current server to the current server’s own IP address, as the current server is the domain controller and the DNS for the forest. This needs to be performed at Server Manager → 1 GB Ethernet Adapter → Properties → TCP/IP IPv4 → Properties.

16. After this step, make sure you can nslookup and ping your domain name. It should resolve to the current server’s IP address.

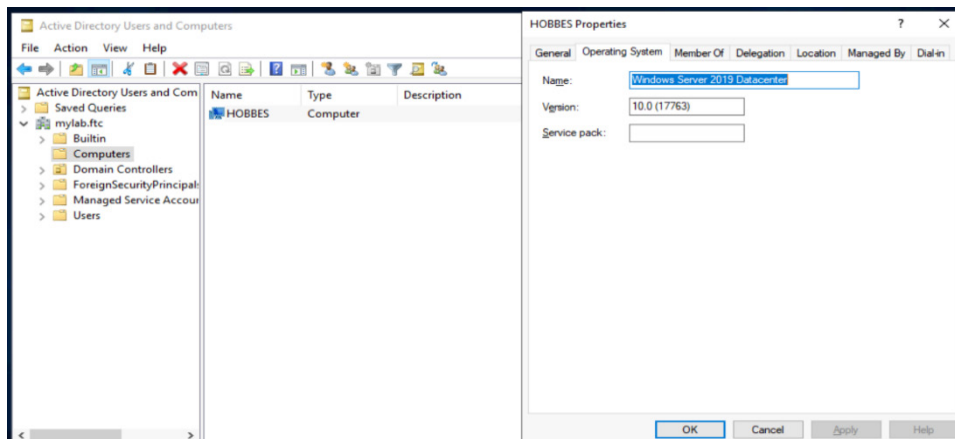
Join the servers to the Active Directory Domain

The Storage Spaces Direct cluster servers must be joined to that domain. Perform the below steps on all the Storage Spaces Direct cluster servers.

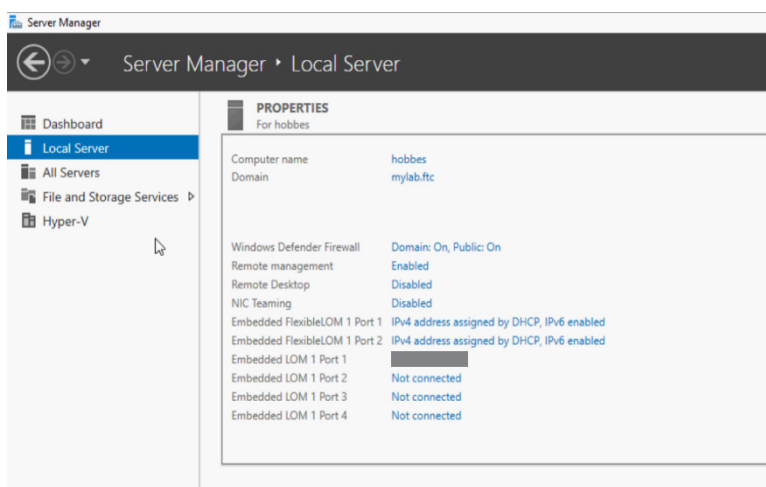
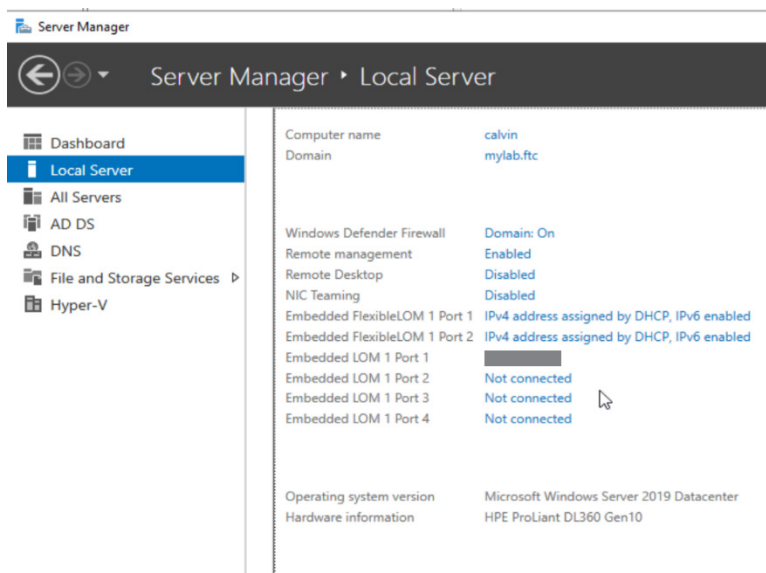
1. Rename the cluster servers to have a meaningful name that will be easy to remember/identify. This can be done in Server Manager.
2. Go to Server Manager → 1 GB Ethernet → Properties → TCP/IP IPv4 → Properties and set the preferred DNS to the IP address of Active Directory domain controller.
3. Make sure you can nslookup and ping the domain name.
4. Make sure you can nslookup and ping <domain_controller>.<domain_name>
5. Once the nslookup and ping works, go to Server Manager → Local Server → Workgroup → Change → Add to Domain and enter the new domain name.
6. The last step will prompt for a user name and password. Specify the user name/password of an existing user from the domain with privileges to add computers to the domain.
7. A success message will appear.
8. Reboot the server.



9. After the reboot, login to the domain controller server using the domain administrator account and ensure that the newly joined server is visible under Server Manager → Tools → Active Directory Users and Computers.



10. After successfully joining, the Storage Spaces Direct cluster nodes Server Manager will show that they belong to the new domain as shown below:



1. Once the drives are clean, you can enable Storage Spaces Direct using the PowerShell command:

Enable-ClusterStorageSpacesDirect.

```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Enable-ClusterStorageSpacesDirect
0/1 completed
[
  Enabling cluster Storage Spaces Direct
    Node 'calvin': Halting until cache reaches desired state (HDD:'ReadWrite' SSD:'WriteOnly')
    [oooooooooooooooooooooooooooooooooooooooooooooooooooo]
  ]
27% Complete

WARNING: 2019/06/23-03:24:20.365 Node calvin: Disks not claimed - ff0180af-f7cc-4cb9-d8a5-3fb2b25c0f67
WARNING: 2019/06/23-03:24:20.365 Node calvin: Disks not claimed - 0d1c0ab4-9418-b7b2-453e-78e8e311ea63
WARNING: 2019/06/23-03:24:20.365 Node hobbes: Disks not claimed - f8a4a149-3f1e-11ac-7c3a-0bc067de89d1
WARNING: 2019/06/23-03:24:20.365 Node hobbes: Disks not claimed - 908d1bcf-c599-9321-583b-b0ea01dfd7a

Confirm
Are you sure you want to perform this action?
Performing operation 'Enable Cluster Storage Spaces Direct' on Target 'FTQWSSDCLOUDST'.
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): Y
```

2. While Storage Spaces Direct is being configured, you can see that all the raw disk drives from all the nodes in the cluster are visible via the PowerShell command:

Get-StoragePool | Get-PhysicalDisk.

```
PS C:\Users\Administrator.MYLAB> Get-StoragePool

FriendlyName OperationalStatus HealthStatus IsPrimordial IsReadOnly Size AllocatedSize
-----
Primordial OK Healthy True False 6.23 TB 0 B
Primordial OK Healthy True False 6.23 TB 0 B

PS C:\Users\Administrator.MYLAB> Get-StoragePool | Get-PhysicalDisk

DeviceId FriendlyName SerialNumber MediaType CanPool OperationalStatus HealthStatus Usage Size
-----
10 HP 8GB_EM_USB_Drive 097803369010 Unspecified False OK Healthy Auto-Select 7.47 GB
50 MR000240G\FLU 185220CF650 SSD False OK Healthy Auto-Select 223.57 GB
11 MR000240G\FLU 185220CF6F1 SSD False OK Healthy Auto-Select 223.57 GB
504 HP EG001200J\WJQ WFK26JFY HDD True OK Healthy Auto-Select 1.09 TB
506 HP EG000300J\5JP 98F8A35XF20G HDD True OK Healthy Auto-Select 279.4 GB
508 ATA HK000480G\JGF 18361EE3E8FE SSD True OK Healthy Auto-Select 447.13 GB
1004 HP EG001200J\WJQ WFK1RCLQ HDD True OK Healthy Auto-Select 1.09 TB
503 HP EG001200J\WJQ WFK26JQK HDD True OK Healthy Auto-Select 1.09 TB
1003 HP EG000300J\5JP 980A045HF20G HDD True OK Healthy Auto-Select 279.4 GB
507 HP EG000300J\5JP 9830A04HF20G HDD True OK Healthy Auto-Select 279.4 GB
1005 HP EG001200J\WJQ WFK1PWRQ HDD True OK Healthy Auto-Select 1.09 TB
502 HP EG001200J\WJQ WFK26NKH HDD True OK Healthy Auto-Select 1.09 TB
1006 HP EG001200J\WJQ WFK1VS7L HDD True OK Healthy Auto-Select 1.09 TB
1007 HP EG001200J\WJQ WFK1M7L1 HDD True OK Healthy Auto-Select 1.09 TB
509 ATA HK000480G\JGF 18361EE3E994 SSD True OK Healthy Auto-Select 447.13 GB
505 HP EG001200J\WJQ WFK26L7Y HDD True OK Healthy Auto-Select 1.09 TB
1002 HP EG000300J\5JP 98F804UMF20G HDD True OK Healthy Auto-Select 279.4 GB
1008 ATA HK000480G\JGF 18341EA275E1 SSD True OK Healthy Auto-Select 447.13 GB
1009 ATA HK000480G\JGF 18341EA27A0B SSD True OK Healthy Auto-Select 447.13 GB

PS C:\Users\Administrator.MYLAB>
```

Test the cluster

Once Storage Spaces Direct has been successfully created, it can be tested using the PowerShell command:

```
Test-Cluster -Node <server1_name>.<domain_name>, <server2_name>.<domain_name> -Include "Storage Spaces Direct", Inventory, Network, "System Configuration".
```

NOTE

It is important that all the tests pass before moving forward with the next steps. Any failures in the tests need to be resolved before proceeding.

```
PS C:\Users\Administrator.MYLAB> Test-Cluster -Node calvin.mylab.ftc, hobbes.mylab.ftc -Include "Storage Spaces Direct", Inventory, Network, "System Configuration"
```



Create volumes

Once Storage Spaces Direct has been successfully enabled, the volumes (LUNs) can be carved out of the storage pool formed from the combined raw disk drives from all the nodes in the cluster.

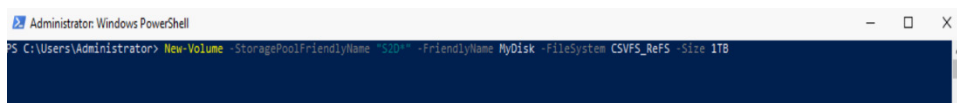
For information about planning and creating volumes in Storage Spaces Direct, see the following documentation from Microsoft:

- [Planning volumes in Storage Spaces Direct](#)
- [Creating volumes in Storage Spaces Direct](#)

To create a volume, run the PowerShell command:

```
New-Volume -StoragePoolFriendlyName "S2D*" -FriendlyName <volume_name> -FileSystem CSVFS_ReFS |  
CSVFS_NTFS -Size <number>TB
```

Refer to the New-Volume PowerShell command line document reference at Microsoft website for more details on the usage.



Additional resources

This document is not intended to replace the Storage Spaces Direct deployment guides from Microsoft and other related PowerShell reference documentation. It is intended to capture the experiences of deploying Storage Spaces Direct on Windows Server 2019 using the two-node cluster configuration as provided by the HPE Small Business Solution for High Availability Storage. Please refer to the following links for more details:

- [Deploying Storage Spaces Direct from Microsoft](#)
- [Overview of Azure Stack HCI from Microsoft](#)
- [HPE and Microsoft Alliance—Azure Stack HCI Solutions](#)
- [Technical white paper from HPE on Implementing Azure Stack HCI with Windows Server 2019](#)
- [Creating Volumes in Storage Spaces Direct from Microsoft](#)
- [HPE iLO 5 User Guide](#)
- [HPE Service Pack for ProLiant \(SPP\)](#)
- [PowerShell command-let reference guide from Microsoft](#)



SUPPORT AND OTHER RESOURCES

HPE enterprise support

- For live assistance, go to the contact HPE website: hpe.com/assistance.
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website: hpe.com/support/hpesc.

Updates

Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

- To download product updates:
 - Hewlett Packard Enterprise Support Center: hpe.com/support/hpesc.
 - Hewlett Packard Enterprise Support Center, software downloads: hpe.com/support/downloads.
 - Software Depot: hpe.com/support/softwaredepot.
- To subscribe to eNewsletters and alerts: hpe.com/support/e-updates.
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center, More Information on Access to Support Materials page: hpe.com/support/accesstosupportmaterials.

IMPORTANT

Access to some updates might require product entitlement when accessed through the HPE Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website: support.hpe.com/hpesc/public/home.

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

- HPE Get Connected: hpe.com/services/getconnected
- HPE Proactive Care Services: hpe.com/services/proactivecare
- HPE Proactive Care Services, supported products list: hpe.com/services/proactivecaresupportedproducts
- HPE Proactive Care Advanced service, supported products list: hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information

- Proactive Care Central: hpe.com/services/proactivecarecentral
- Proactive Care Central—Get Started: hpe.com/services/proactivecarecentralgetstarted



Warranty information

To view the warranty information for your product, see the links provided below.

- HPE ProLiant and IA-32 servers and options: hpe.com/support/proliant-servers-warranties
- HPE Storage products: hpe.com/support/storage-warranties
- HPE Networking products: hpe.com/support/networking-warranties

Regulatory information

To view the regulatory information for your product, view the Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products, available at the [Hewlett Packard Enterprise Support Center](http://Hewlett-Packard-Enterprise-Support-Center).

Documentation feedback

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APPENDIX A: MIGRATING TO MICROSOFT WINDOWS SERVER 2019

Microsoft Windows Server 2008 is reaching end of support (EoS) in 2019, and Windows Server 2012 will also be reaching EoS before long. SMBs need a strategy for migrating existing applications and data that are running on older hardware and older versions of Windows Server. This section discusses some of the strategies and details for migrating to Windows Server 2019 with a focus on resolving some issues specific to SMBs.

Migration considerations

For most SMBs there are three types of data to consider when migrating to new server platforms:

- Migrating Active Directory-Directory Services (ADDS)
- Migrating file storage data
- Migrating applications and databases

There are two primary methods used to migrate these data types:

- Upgrade in place—HPE does not recommend upgrade in place, especially if running older versions of applications on old hardware.
 - a. Old hardware will not likely meet system requirements for upgrade in place to new operating system or new application
 - b. Old applications may not be compatible with new operating systems
 - c. Even if it is possible (and supported) to upgrade in place, the chances are high that you will simply be rolling old digital artifacts that have accumulated over the years into your upgraded deployment, increasing the chances of support calls that you were trying to avoid by not migrating in the first place
- Physical to Physical (P2P) migration—deploy the latest version of the application on new hardware running a new operating system and then migrating the application data from the old system to the new system.
- Physical to Virtual (P2V) migration—similar to P2P, but the target system is a virtual machine running the latest application on new hardware running a new operating system and then migrating the application data from the old system to the new system.
- Physical to Virtual (P2V) conversion—a temporary “stop-gap” solution where a conversion utility is run on the old server to convert it to a format that can be run on a new virtualization host.

This section covers the considerations and steps for migrating the three data types using both migration methods, with links to outside resources where appropriate.

Migrating ADDS (P2P or P2V)

1. Deploy a physical server with the Windows Server 2019 operating system (OS) as noted in this document or provision a virtual server with the Windows Server 2019 OS.
2. Install ADDS and promote the server to a Domain controller, thus synchronizing it to the existing domain.
3. Transfer the Active Directory Flexible Single Master Operations (FSMO) roles from the old server to the new server.
4. **IMPORTANT:** If the old server is to be decommissioned, uninstall ADDS from the old server while it is still on the network and connected to the new ADDS server. This will ensure the best possible cleanup of ADDS database objects. If the old server is decommissioned or re-purposed without this step you must manually clean Active Directory which requires very specialized skills and could negatively impact Active Directory.
5. **Recommended:** if the old server will be decommissioned after uninstalling ADDS:
 - a. Reset the password for the local administrator account
 - b. Unjoin the domain using the System Properties settings
 - c. Reboot the server and log in with the local administrator account



6. **Recommended:** Set the Active Directory Functional Level to the highest level appropriate for your environment, which is the oldest version of Windows still running ADDS. Note that if you leave the old server running ADDS until a later date, the Active Directory Functional Level must remain at the level of the old server.

For more details on the established procedures for this step, refer to the [Microsoft documentation](#).

IMPORTANT

Never perform P2V conversion on a Windows server that is running ADDS. If you need to migrate a server that is running ADDS, perform the ADDS migration procedure noted above, then demote the old ADDS server and uninstall ADDS before performing a P2V conversion of other applications and data on the old server. It is extremely vital that you plan ahead for ADDS migration. For more details, refer to the [Microsoft documentation](#).

Migrating file storage data (P2P or P2V migration)

In many cases, file migration provides a “clean” migration of file storage and an opportunity to archive very old files that are no longer used. When migrating file storage data, both manual and automated methods are available. The Microsoft Storage Migration Service can be used to aid in migration of files on Windows Server 2003 and later, as well as some Linux file storage running on Samba. For more details on the established procedures for migrating file storage data, refer to the [Microsoft article](#).

Migrating applications and databases (P2P or P2V migration)

The steps for migrating applications and/or databases to a new physical server or OS are highly dependent on application compatibility and vendor requirements. HPE recommends that you work with your application or database vendor for a successful migration.

Converting applications and databases (P2V conversion)

Using the P2V conversion method enables you to continue running an application or database on the older OS. This is particularly useful when the application is not supported on newer OS or hardware. This method enables you to run the application on a new server running Windows Server 2019 right away while giving you more time to evaluate a migration plan for your unsupported application. This method can also help protect against failure of older hardware during an “upgrade in place.”

IMPORTANT

Never perform P2V conversion on a Windows server that is running ADDS. If you need to migrate a server that is running ADDS, perform the ADDS migration procedure noted above, then demote the old ADDS server and uninstall ADDS before performing a P2V conversion of other applications and data on the old server. It is extremely vital that you plan ahead for ADDS migration. For more details, refer to the [Microsoft documentation](#).

1. Prepare a new Windows Server 2019 Hyper-V virtual machine (VM).
 - a. If not already completed, install Windows Server 2019 on new server and add the Hyper-V role.
 - b. Optional: create a shared folder to serve as a temporary repository for the VHD/VHDX files that will be created by the conversion utility.
 - c. In the Hyper-V manager, configure the storage location for VHD/VHDX disks.
 - d. In the Hyper-V manager, create a VM that will replace the old server. When creating the VM, select “Attach a virtual hard disk later.” Do not configure disks for this VM—they will be added later in this procedure.
2. Prepare the old server to be converted to a virtual machine.
 - a. Optional: map a network drive to the temporary VHD/VHDX repository on the Windows Server 2019 server.
 - b. Recommended: quiesce any transactional services (such as databases or logging services) prior to running the conversion utility. Consider safely shutting down these services because they could potentially create a transactional-consistency issue. These services will start up according to their default settings when the server boots up in the VM.



3. Convert disks to VHDXs.
 - a. Download, install, and run the [Microsoft Sysinternals Disk2vhd conversion utility](#) on the machine to be converted to VHDX.
 - b. In the utility, set the “VHD File name:” to the path for storing the virtual disk files that will be created. Best practice is to choose a storage location that is not on the same physical disk being converted. The fastest method would be to select a different physical disk on the same system. Or, use the optional mapped network drive created on the new Windows Server 2019 server.
 - c. Select VHD or VHDX virtual disk type. Choose VHDX unless your application does not support VHDX; check your app’s requirements to be sure you are selecting the correct format.
 - d. Decide whether you will use Volume Snapshot Service (VSS). Choose VSS unless your application does not support VSS. Check your app’s requirements to determine if VSS is supported.
 - e. Select the physical disk(s) to be converted. Also select the System Reserved disk if the disk to be virtualized is the boot disk.
 - f. Click “Create” to start the conversion.
4. Add converted VHD(X) disks to the new VM.
 - a. Move the newly created virtual disks to the folder defined in the Hyper-V settings as the home folder for the new VM, if necessary.
 - b. Open the Hyper-V manager, right-click the VM that will host the new disks, and select “Settings.”
 - c. Select “IDE Controller” in the navigation pane and then “Hard Drive” in the settings pane, then click “Add.”
 - d. Browse to the VHD(X) disk file and click “Apply,” then “OK.”
 - e. Repeat these steps for additional drives as needed.
5. Shut down the old machine.

IMPORTANT

Shut down and disconnect the old machine from the network to prevent a Domain Account conflict.

6. Boot the new VM.
 - a. Verify data and services are present and functioning correctly.
 - b. Verify the new VM is running satisfactorily and the application data is correct.
7. Decommission the old server.

IMPORTANT

Do not run the old server on the network once the converted VM is started, unless you are rolling back to the old server, in which case ensure that the new VM is not running before starting the old server.



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