

Micron Technology, Inc.

Micron NVMe SSD Best Practices on Microsoft Azure Stack HCI

Windows Server 2019 Data Center + Storage Spaces Direct (as
SDS) + RDMA + Micron NVMe 9300 SSD + Micron 5300 SSD

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Introduction

Microsoft released its new Azure Stack HCI solution with RDMA (Remote Direct Memory Access) with Windows Server 2019. RDMA is advanced technology which can improve the storage pool access. Windows Server 2019 can use software-defined storage, which Microsoft offers with Storage Spaces Direct. It can use multiple combinations of storage disks, such as NVMe™ + SSD, NVMe+HDD or SSD+HDD, whatever is needed to fit into each scale. Azure Stack HCI (Microsoft's hyperconverged infrastructure solution) can use RDMA well. Microsoft recommends iWARP protocols if your network is based on a traditional TCP/IP base standard. If you are using InfiniBand, please use RoCE v2.

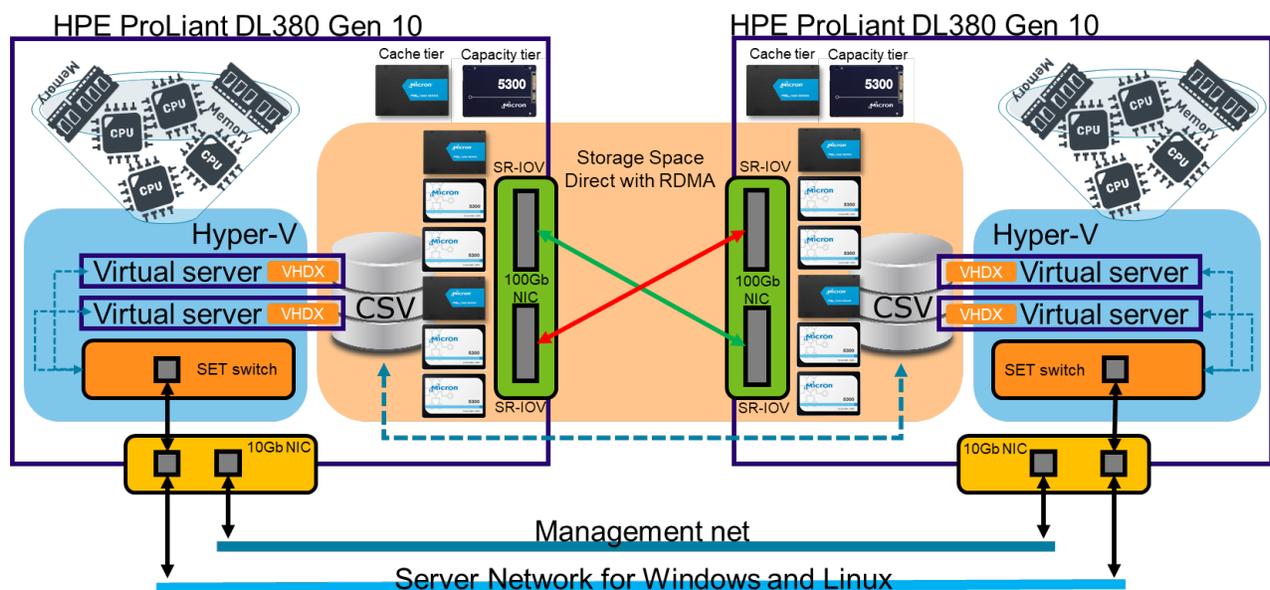
General Information

Network Structure

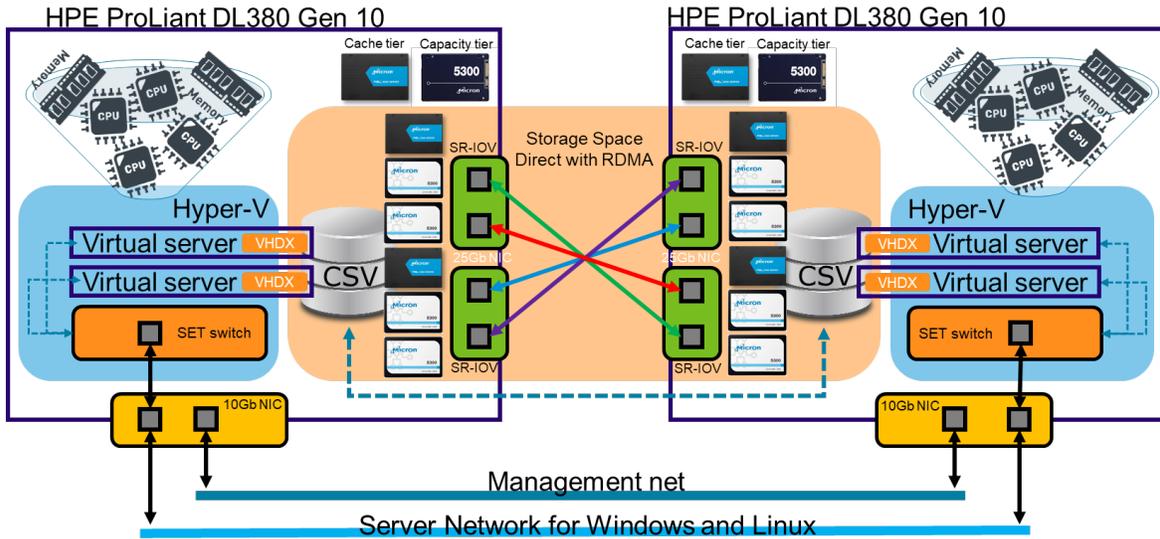
Option 1: Direct Connect

If you are using just 2 Nodes, please connect it as below. You do not need to ready any Network switch for storage access. Direct connection will be enough for you.

100GB NIC

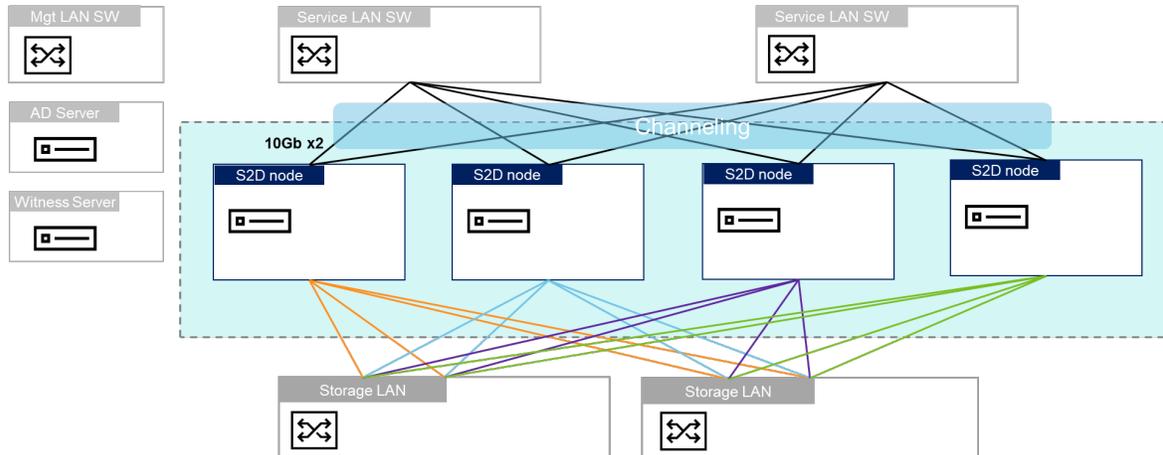


25GB NIC



Option 2: Switched Network

If you need to use three nodes or more, please ready the storage network switches. Micron has used Cisco-Nexus 9336c-FS2 switch, which can speak iWARP protocol to enable RDMA.



1. Network port setting

Please discuss maximum MTU size with your local network team. Cisco announced that MTU 9000 bytes will be the standard frame size for a jumbo frame for VXLAN. If you would like to use MTU 1500 bytes frame, it works fine also. MTU 9000 will enable better access to your storage pool, however.

2. VLAN

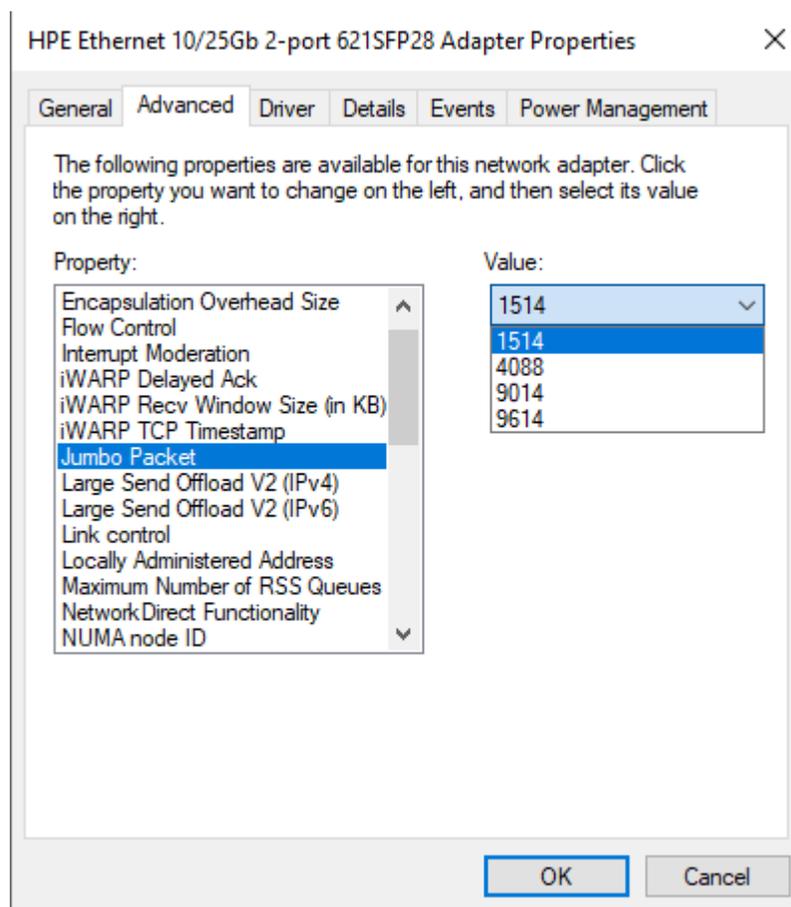
Please plan to have the below VLAN on the server:

1. Service VLAN

- Your customer will access your VM on Hyper-V or via the volume/file/folder on Storage Spaces Direct as file server through Service LAN.

2. Storage VLAN

- This is for a pure storage network. Please discuss this with your network team. If you use direct connect with two nodes, you do not need to discuss the configuration below with your network team and can configure NIC setting by yourself.
- MTU size (1500 or 9000)

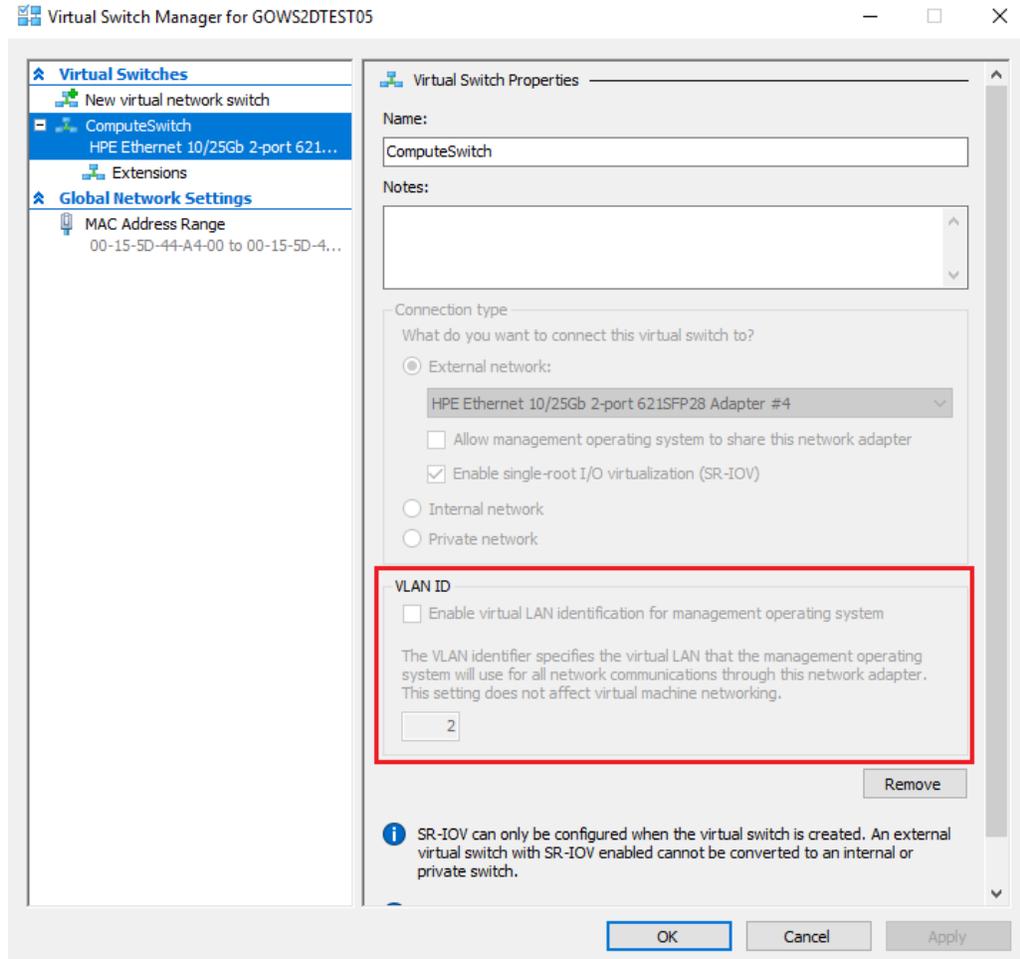


- ① iWARP or InfiniBand (RoCEv2)
- ② port can be 10GB or 25GB or 50GB or 100GB

3. Management VLAN

- The Management VLAN is the interface the system administrator uses to operate your server. You can use a dedicated 1 GB port or the Service VLAN for management on a SET switch. Please configure a SET switch for

management also if you do not have network port for management on server.



4. Console VLAN

- Console VLAN will be used for iLO. HPE iLO will bring remote console for you.

3. Network cable

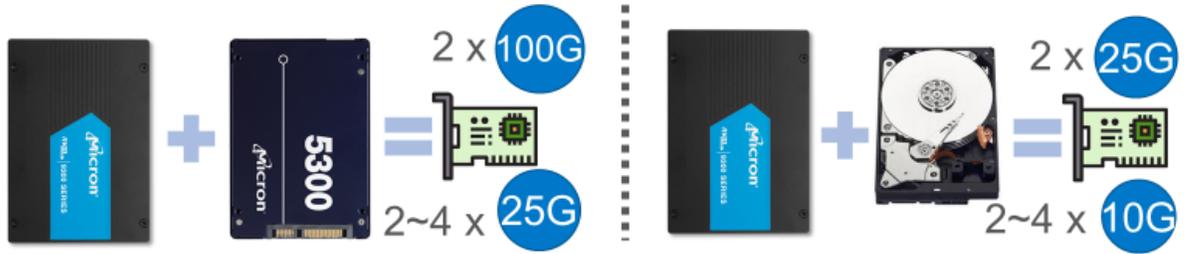
Please find out correct network cabling with your network team. You need to investigate the network card (NIC) spec closely. I have used “25GbE SFP28 SR LC” + “LC-LC OM3 fiber cable” to support a 25GB network. However, you can use other choices as below.

- Optical Transceivers 40GbE QSFP+ with fiber cable
- Optical Transceivers 50GbE QSFP28 with fiber cable
- Optical Transceivers 100GbE QSFP28 with fiber cable
- Direct attach copper (DAC) [copper cables]
- Active optical cables (AOC) – Transceivers with integrated fibers

4. Network card on Server.

A single NVMe SSD will consume 25GbE bandwidth. If you plan to have 4 x NVMe SSDs, please plan to have 4 x 25G ports. If you try to use 100GbE, please make sure of your NIC spec and motherboard. 100GbE will require a PCIe gen 4 bus. Please review below points. A PCIe Gen 3 bus will reach the limits of the hardware.

Network bandwidth requirement for Disk



PCI Express link performance^{[39][40]}

Version	Introduced	Line code	Transfer rate ^{[1][11]}	Throughput ^{[1][11]}				
				x1	x2	x4	x8	x16
1.0	2003	8b/10b	2.5 GT/s	250 MB/s	500 MB/s	1.0 GB/s	2.0 GB/s	4.0 GB/s
2.0	2007	8b/10b	5.0 GT/s	500 MB/s	1.0 GB/s	2.0 GB/s	4.0 GB/s	8.0 GB/s
3.0	2010	128b/130b	8.0 GT/s	984.6 MB/s	1969.2 MB/s	3938.5 MB/s	7.877 GB/s	15.754 GB/s
4.0	2017	128b/130b	16.0 GT/s	1969.2 MB/s	3938.5 MB/s	7.877 GB/s	15.754 GB/s	31.508 GB/s
5.0	2019	128b/130b	32.0 GT/s ^[14]	3938.5 MB/s	7.877 GB/s	15.754 GB/s	31.508 GB/s	63.015 GB/s
6.0 (planned)	2021	128b/130b & PAM-4	64.0 GT/s	7.877 GB/s	15.754 GB/s	31.508 GB/s	63.015 GB/s	126.03 GB/s

https://en.wikipedia.org/wiki/PCI_Express



Hardware Information

1. Please refer to the below server hardware configuration.

Micron has used Cascade Lake with HPE DL380 Gen 10.

S2D Node (DL380 Gen10 8SFF CTO) x 2 server HW			
Category	description	Part#	Qty
Server	DL380 Gen10 8SFF(2.5 inch) base unit	868703-B21	1
CPU (Cascade lake)	Xeon G 6248 2.5GHz 1p20c x2 (2p/40c)	P02502-B21 P02514-L21	1 1
memory	32GB 2Rx4 PC4-2933Y-R Smart memory kit (768GB)	P00924-B21	24
Rear 2SFF drive cage	DL38x Gen10 2SFF(2.5inch) premier drive cage	826687-B21	1
Boot disk	Micron 5300 SATA SSD 480GB MU SC 2.5 (RAID1)	-----	2
Storage controller for OS	Smartアレイ P408i-a SR Gen10 controller	804331-B21	1
Smart Array option	Smart storage hybrid capacity 145mm	P02377-B21	1
Drive cage	DL38x Gen10 8xNVMe Express bay kit	826689-B21	1
Cache drive	NVMe 9300 MAX 3.2TB MU U.2 (2.5 inch, 15mm) [MTFDHAL3T2TDR-1AT1ZABYY]	-----	2
Secondary Riser	DL38x Gen10 Secondary NVMe x4 Riser	873732-B21	1
Storage controller (S2D)	Smart Array P408i-p SR Gen10 controller	830824-B21	1
Capacity drive	Micron 5300 PRO SATA SSD 3.84TB MU SC 2.5	-----	4
NIC for Service LAN	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 adapter	867334-B21	1
Transceiver	10GbE SR SFP+ module	455883-B21	2
NIC for RDMA	HPE Ethernet 10/25Gb 2-port 621-SFP28 adapter	867328-B21	2
Transceiver	25Gb SFP28 SR 100m LC transceiver	845398-B21	4
Power supply	800W FS Platinum LH power supply	865414-B21	2
Fan	DL38x Gen10 high performance fan kit include 6 x Fans	867810-B21	1
Rack mount kit	2U SFF Easy Install rack rail kit	733660-B21	1
OS	Windows Server 2019 Data Center Edition	Micron own	-
software	OneView Advanced (include iLO Advanced)	E5Y34A	1

2. If you are not familiar with your hardware configuration, please find a good one from the Microsoft catalog. These servers come tested by Microsoft and the server hardware vender. You just need to consider which network card to fit into your environment, and the most compatible disk size.

<https://azure.microsoft.com/en-us/products/azure-stack/hci/catalog/>

3. Server sizing for Azure stack HCI

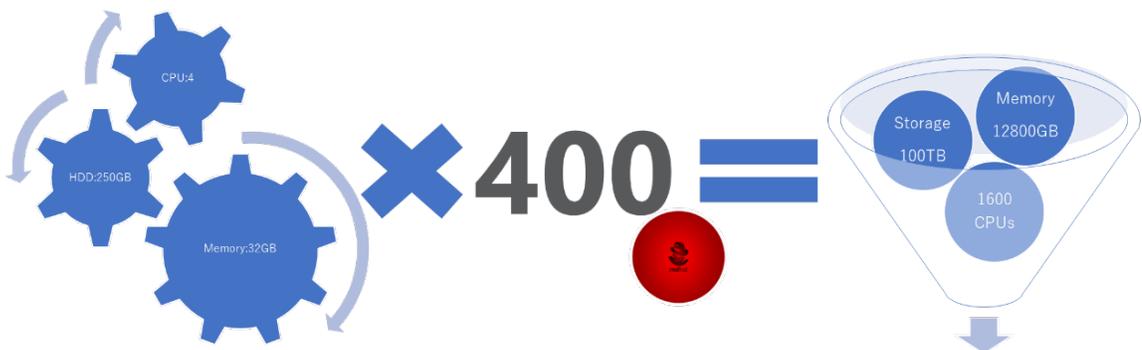
How many servers do you need for Azure Stack HCI? It's better to have good example. Here is one scenario to consider:

Scenario: you need to install a virtual desktop infrastructure (VDI) solution for your company to improve the user experience for remote workers.

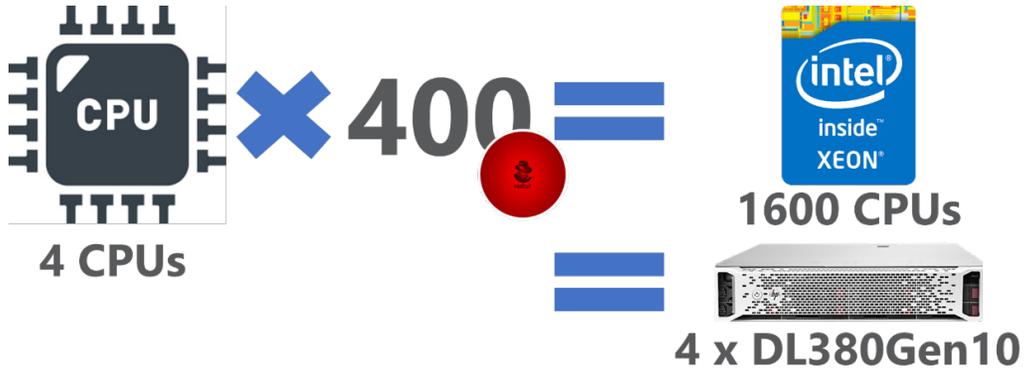
Your company uses the following standard Linux hardware.



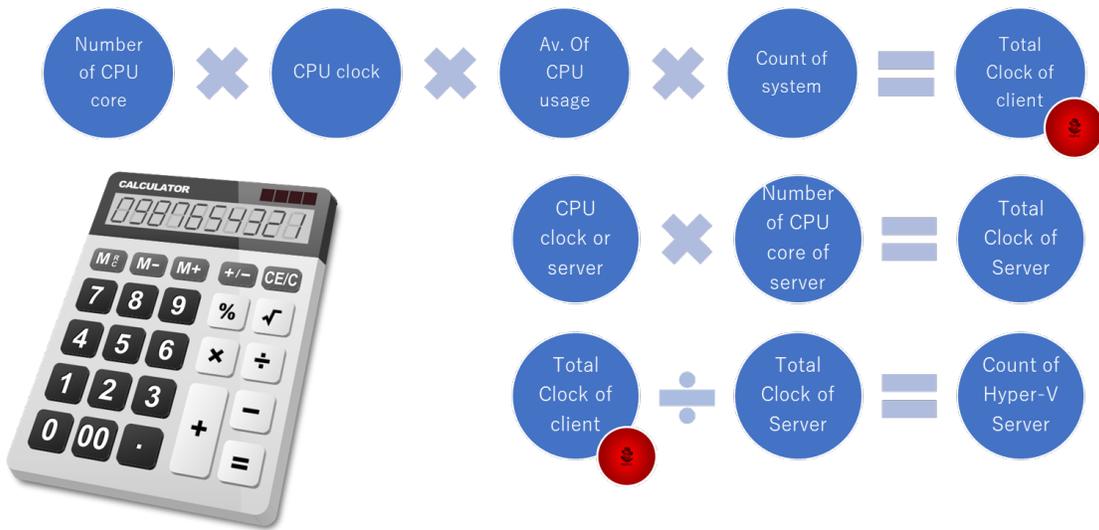
You would like to replace 400 Linux clients with a VDI solution, so you might choose these servers:



A new VM client will need four CPUs at least.



Please refer to the calculator below to calculate how many nodes do you need.



When you follow it, the result will be...

Server HW sizing for VDI solution

<https://newsroom.intel.co.jp/news/xeon-scalable-5g-network-portfolio-launch/#gs.4m622m>

Number of CPU core (4) × CPU clock (3.4 GHz) × Av. Of CPU usage (0.2) × Count of system (400) = Total Clock of client (1088 GHz)

CPU clock or server (2.7 GHz) × Number of CPU core of server (56 core) = Total Clock of Server (302.4 GHz)

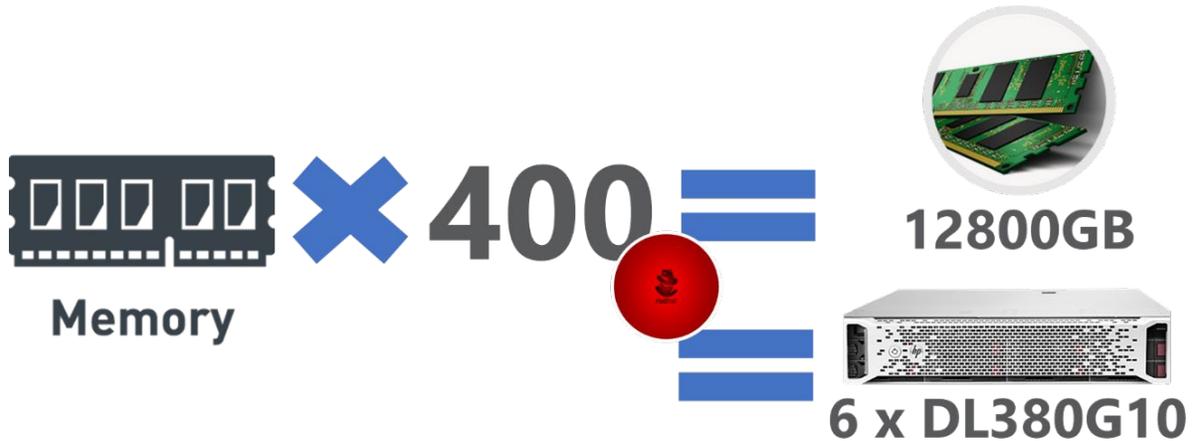
Total Clock of client (1088 GHz) ÷ Total Clock of Server (302.4 GHz) = Count of Hyper-V Server (3.6)

Result: 4 x Azure stack HCI servers

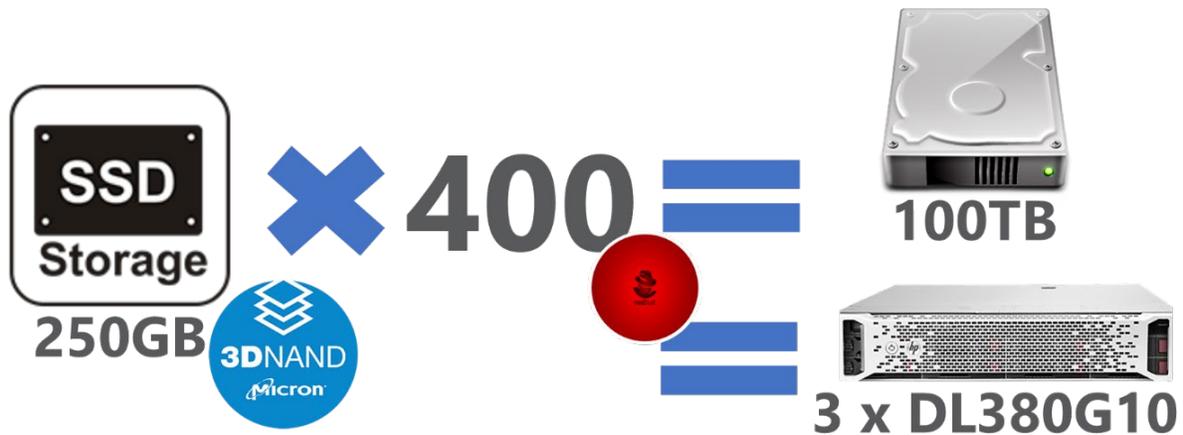
Xeon Gold 6258R

2ND GEN INTEL XEON SCALABLE PROCESSOR PORTFOLIO ENHANCEMENT							
Processor Number	Cores	Base Clock Speed (GHz)	Turbo Boost (GHz)	Cache (MB)	TDP (W)	Intel Optane Persistent Memory Support	Pricing (PCP)
Xeon Gold 6258R	28	2.7	4.0	38.5	208	Yes	\$3,900
Xeon Gold 6256	12	3.6	4.5	33	205	Yes	\$3,000
Xeon Gold 6250	8	3.9	4.5	35.75	189	Yes	\$1,900
Xeon Gold 6248R	24	3.0	4.0	35.75	205	Yes	\$2,300
Xeon Gold 6246R	16	3.4	4.1	35.75	205	Yes	\$3,286
Xeon Gold 6240R	20	3.1	4.1	35.75	205	Yes	\$2,528
Xeon Gold 6238R	24	2.4	4.0	35.75	165	Yes	\$2,449
Xeon Gold 6236R	28	2.2	4.0	38.5	165	Yes	\$2,817
Xeon Gold 6230R	26	2.1	4.0	35.75	150	Yes	\$1,884
Xeon Gold 6228R	16	2.9	3.8	22	150	Yes	\$1,326
Xeon Gold 6226R	16	2.9	3.5	22	150	Yes	\$850
Xeon Gold 5220R	24	2.2	4.0	35.75	150	Yes	\$1,550
Xeon Gold 5218R	20	2.1	4.0	27.5	125	Yes	\$1,013
Xeon Silver 4215R	8	3.2	4.0	11	100	Yes	\$760
Xeon Silver 4214R	12	2.4	3.5	16.5	100	Yes	\$600
Xeon Silver 4210R	10	2.4	3.2	13.75	100	Yes	\$501
Xeon Silver 4210T	10	2.3	3.2	13.75	95	No	\$554
Xeon Bronze 3208R	8	1.9	1.9	11	65	No	\$308

Memory: It appeared to require six servers. But Microsoft's Hyper-V hypervisor can use memory resources efficiently. so you need only four or five nodes in this scenario.



Storage: You need three nodes at least.



Four nodes should be good. But five nodes will be better to allow extra maintenance memory for the system administrator. So, you will not have only one node at that time – three nodes will be available during the maintenance. Five nodes will be best for stable operation.

4. How to choose the CPU
 - a. The following link has benchmark data about CPU.
 - i. <http://spec.org/>
 - b. Please follow the step below.

Standard Performance Evaluation Corporation

Home Benchmarks Tools **Results** Contact Site Map Search Help

Results

- Published Results
- Results Search
- Fair Use Policy

Information

- CPU2017
- Documentation
 - Overview
 - System Requirements
 - Run & Reporting Rules
 - Using SPEC CPU2017
 - Benchmarks
 - Technical Support

Search all SPEC CPU 2017 results

Search all SPEC CPU 2017 Integer Speed results

Search all SPEC CPU2017 Results

These results have been submitted to SPEC; see the disclaimer before studying any results.

Available Results

Browse

The following are sets of available results since the announcement of the benchmark in June 2017.

- All CPU2017 Results

Results from all publication quarters, broken out by reported metric:

- Speed: [SPECspeed 2017 Integer, SPECspeed 2017 Floating Point]
- Throughput: [SPECrate 2017 Integer, SPECrate 2017 Floating Point]

Results broken out by the year and quarter wherein they were published:

- 2019, Quarter: [1, 2, 3, 4]
- 2018, Quarter: [1, 2, 3, 4]
- 2017, Quarter: [1, 2, 3, 4]

Search

Use the CPU2017 Search Form to make dynamic selections from the available results.

Home - Contact - Site Map - Privacy - About SPEC

This suggested benchmark option was defined in 2017, but you select another one.

c. Please input your server hardware name.

SPEC/OSG Result Search Engine

Available Configurations: All SPEC CPU2017

Search Form Request: Simple Advanced

CPU2017 Results -- Form

This configuration offers access to summary information across all CPU2017 results. Use a benchmark specific configuration.

Configurable Request

Control the content, the ordering, and the format, of the search results. The features provided in this form

Content Case-Sensitive

Specify what columns you want to see, and which records would qualify.

Column

Column	Display
Hardware Vendor	Display
System	Display
Peak Result	Display
Base Result	Display

Criteria

If specified, display only those results that qualify

matches	Hewlett Packard Enterprise
matches	ProLiant DL380 Gen10
equals	
equals	

Duplicates

Define duplicates, and how to handle them.

Display all results, including duplicates

Hardware Vendor:

System:

Peak Result:

Published:

Publication

Specify which quarterly issues to search in.

Earliest Newsletter:

Latest Newsletter:

Sorting

Specify in what order you would like to see the results returned.

Key	Column	Direction
Primary	Hardware Vendor	Ascending
Secondary	System	Ascending
Tertiary	# Chips	Descending

Format

Specify in what form the results should be returned.

HTML, L2 Table Professional Text Column Separated Values

Execute

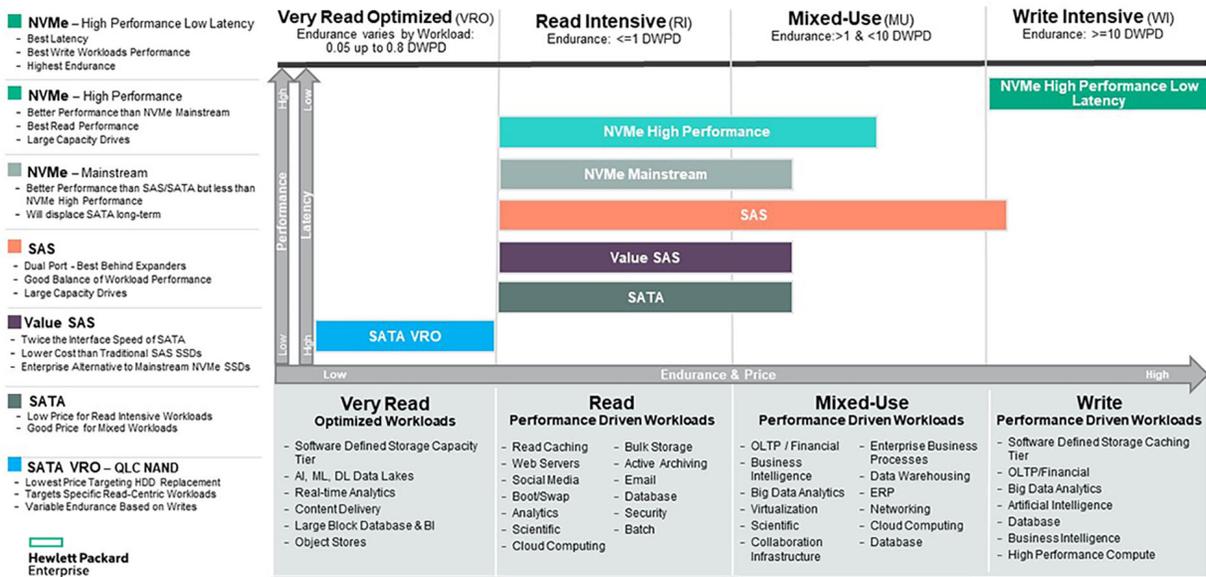
d. The Hypervisor may require good performance from multiple cores.

- i. <https://assets.ext.hpe.com/is/content/hpedam/a00019564jpn>
- ii. https://support.hpe.com/hpsc/public/docDisplay?docId=a00019682en_us&docLocale=en_US

One of the following depending on model:			
Type	HPE DDR4 SmartMemory, Registered Dual In-line Memory Module (RDIMM), Load Reduced Dual In-line Memory Module (LRDIMM)		
Memory⁵	Dual In-line Memory Module (DIMM) slots available	24	12 DIMM slots per processor, 6 channels per processor, 2 DIMMs per channel
	Maximum capacity (LRDIMM)	3.0TB	24 x 128GB LRDIMM - 2933 MT/s
	Maximum capacity (RDIMM)	1.54TB	24 x 64GB RDIMM - 2933 MT/s
	Maximum capacity (HPE Persistent memory)	6.0TB	12 X 512GB Memory Modules - 2666 MT/s
	Maximum capacity Non-Volatile Dual In-line Memory Module (NVDIMM)	192GB	12 x 16GB NVDIMM - 2666 MT/s

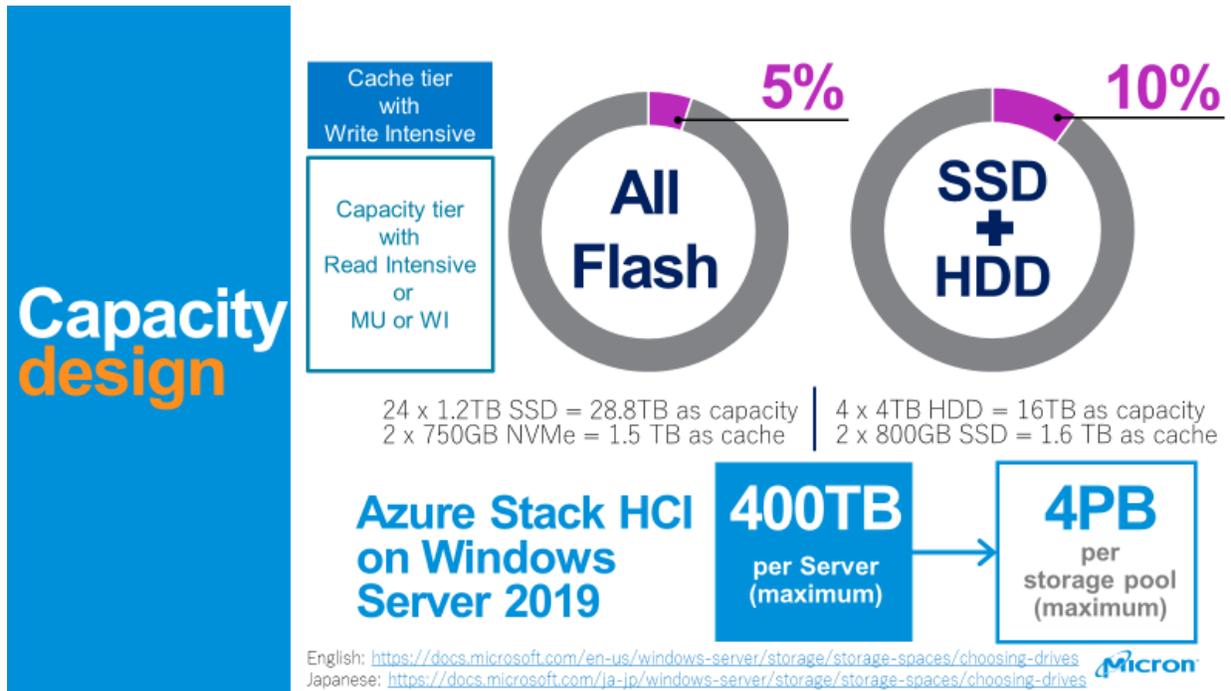
- b. If you want large capacity, I recommend LRDIMM. If not, RDIMM should be OK also. And please choose memory with a high data rate specification.
6. How to choose the disk
- a. Please refer to the information below. You will be able to make some choices about your disk.

HPE Storage Options – SSD Portfolio Alignment



- b. The following SSD selector tool may help:
 - i. <https://ssd.hpe.com/recommendation>
- c. Microsoft recommends write-intensive SSDs for your cache tier. You can use read-intensive or mixed-use SSDs for your capacity tier also.

d. Please design capacity.



i. Microsoft provides guidelines for making the design.

1. English: <https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/choosing-drives>
2. Japanese: <https://docs.microsoft.com/ja-jp/windows-server/storage/storage-spaces/choosing-drives>

About all flash: If you have 24x 1.2TB SSD = 28.8TB for your capacity tier, you need to have 2x 750GB NVMe SSD = 1.5 TB as your cache tier (5% of capacity tier will be required).

About SSD (or NVMe) + HDD: If you have 4x 4TB HDD = 16TB for your capacity tier, you need to have 2x 800GB NVMe or SSD = 1.6 TB as cache tier (10% of capacity tier will be required).

- ii. Please select the correct SSD type/capacity for the cache tier and capacity tier.
- iii. The following is the actual Micron performance data, which may be a good reference for you.
 1. 544K IOPS = 4 x NVMe 9300 as cache tier + 8 x SSD 5300 on 2 x HPE ProLiant DL380 Gen 10 servers with 100GB NIC

2. 462K IOPS = 4 x NVMe 9300 as cache tier + 8 x SSD 5300 on 2 x HPE ProLiant DL380 Gen 10 servers with 25GB NIC
3. 438K IOPS = 4 x NVMe 9300 as cache tier + 8 x SSD 5210 on 2 x HPE ProLiant DL380 Gen 10 servers with 100GB NIC
4. 431K IOPS = 4 x NVMe 9300 as cache tier + 8 x HPE HDD on 2 x HPE ProLiant DL380 Gen 10 servers with 100GB NIC
5. 113K IOPS = 4 x SSD5300 as cache tier + 8 x HPE HDD on 2 x HPE ProLiant DL380 Gen 10 servers with 100GB NIC

Note1: Note: 80 VMs (40 VM per Node) – Azure D1 size (4KB IO Block, 100% Random [67% Read / 33% Write])

Note2: 100GB NIC Mellanox MCX516A-CCAT 100GbE NIC dual port QSFP28

Note3: 25GB NIC HPE Ethernet 10/25Gb 2-port 621-SFP28 adapter [867328-B21]

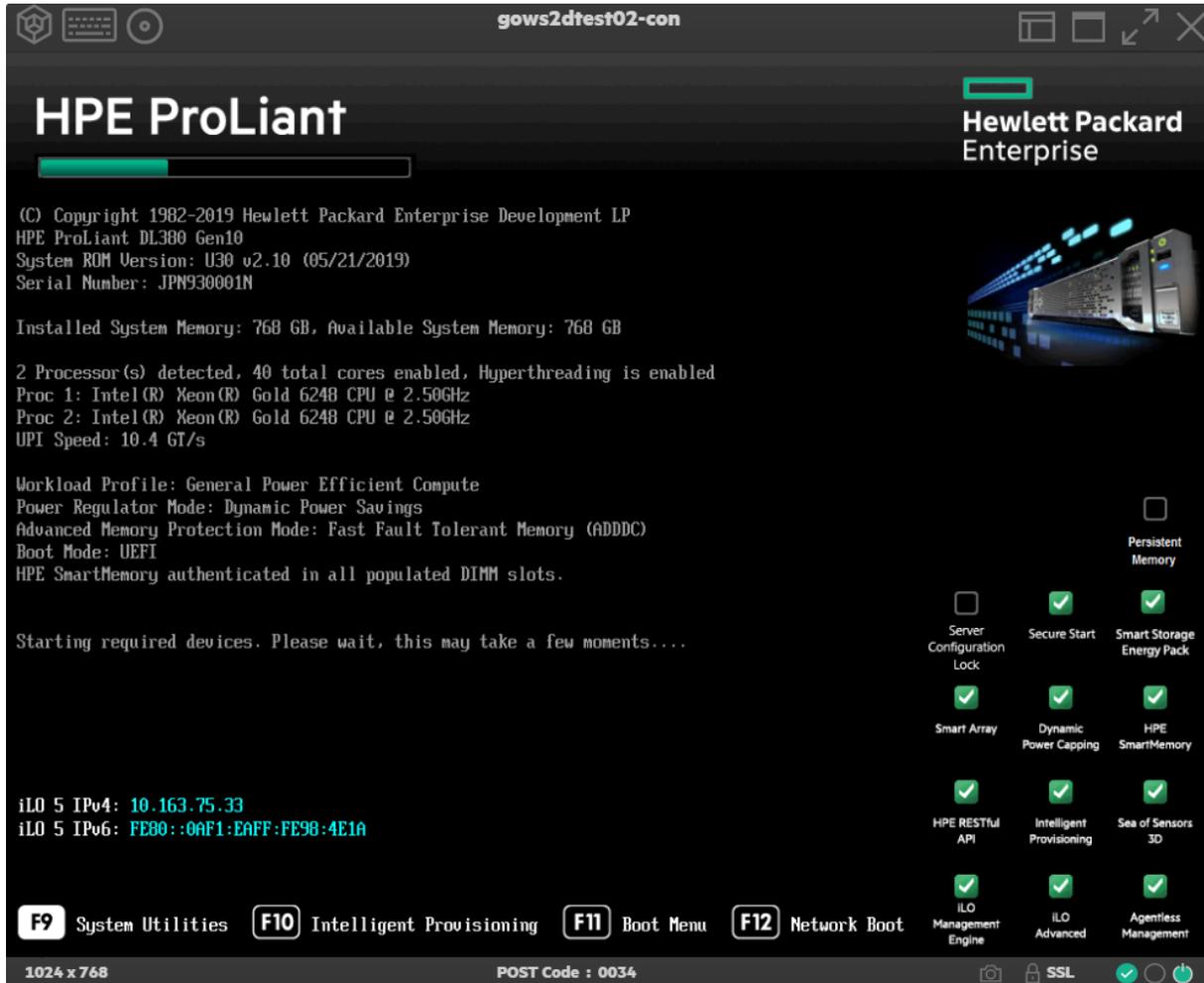
7. How to choose disk controller

- a. HPE offers a lot of choice for disk controllers. However, we do not need to use a high-spec one. We can use a normal disk controller because of two reasons. One is that the HPE standard disk controller has enough specifications even with the entry-level model. The other reason is that Azure Stack HCI uses the pass-through mode (HBA mode). So, no special about disk controller needed. If you have performance issue with your disk controller, I recommend you reach out to Microsoft support and contact your hardware vender. You might also think about queue depth [QD] on your disk controller.

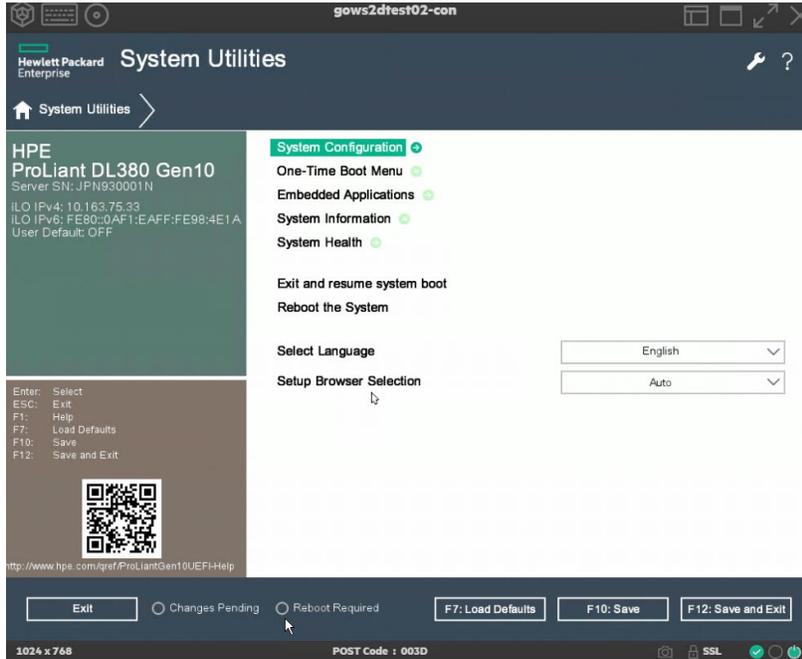
BIOS Configuration

Power On the server.

Please push F9 to get the below screen.



Please select System Configuration



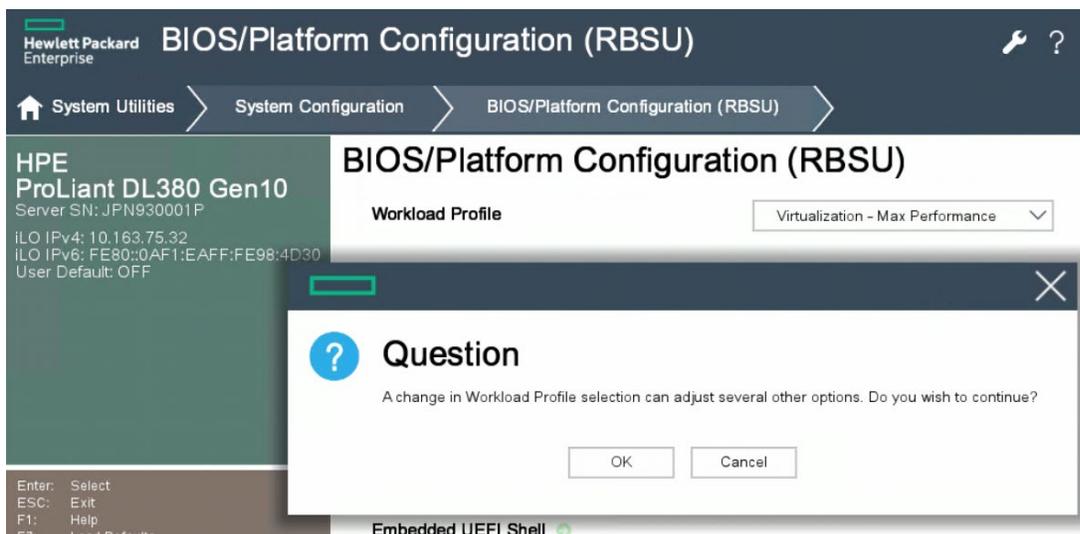
Please select BIOS/Platform Configuration (RBSU). And Please choose Virtualization – Max Performance as below.

Japanese

<https://h50146.www5.hpe.com/products/servers/document/pdf/882269-002ajpn.pdf>

English

https://support.hpe.com/hpsc/doc/public/display?docId=a00018313en_us



Please refer to other profile options.

Workload Profile Dependencies - Intel-based servers

Table 1: Workload Profiles General Power Efficient Compute — Low Latency

	General Power Efficient Compute	General Peak Frequency Compute	General Throughput Compute	Virtualization - Power Efficient	Virtualization - Max Performance	Low Latency
SR-IOV	X	X	X	Enabled	Enabled	Disabled
VT-D	X	X	X	Enabled	Enabled	Disabled
VT-x	X	X	X	Enabled	Enabled	Disabled
Power Regulator	Dynamic Power Savings	Static High Performance	Static High Performance	OS Control	Static High Performance	Static High Performance
Minimum Processor Idle Power Core C-state	C6	X	X	C6	No C-states	No C-states
Minimum Processor Idle Power Package C-state	Package C6 Retention	Package C6 Retention	Package C6 Retention	Package C6 Retention	No C-states	No C-states
Energy Performance Bias	Balanced Performance	X	Max Performance	Balanced Performance	Max Performance	Max Performance
Collaborative Power Control	Enabled	Disabled	Disabled	Enabled	Disabled	Disabled
Intel DMI Link Frequency	Auto	Auto	Auto	Auto	Auto	Auto
Intel Turbo Boost Technology	Enabled	Enabled	Enabled	X	Enabled	Disabled
Intel NIC DMA Channels (IOAT)	Enabled	X	X	X	X	X
HWPrefetcher	Enabled	Enabled	Enabled	X	X	Enabled
Adjacent Sector Prefetch	Enabled	Enabled	Enabled	X	X	Enabled
DCU Stream Prefetcher	Enabled	Enabled	Enabled	X	X	Enabled
DCU IP Prefetcher	Enabled	Enabled	Enabled	X	X	Enabled

Table Continued

Please select onboard disk controller (HPE Smart Array)

The screenshot shows the HPE System Configuration utility interface. The left sidebar displays server information for an HPE ProLiant DL380 Gen10, including the server SN (JPN930001N) and ILO IP addresses. The main content area is titled "System Configuration" and shows the "BIOS/Platform Configuration (RBSU)" menu. A yellow callout box highlights the "Slot 1 : HPE Smart Array P408i-p SR Gen10" option, which is currently selected. Other options include Embedded RAID 1, Embedded LOM ports, and Embedded FlexibleLOM ports. The bottom of the screen shows navigation buttons for Exit, Changes Pending, Reboot Required, F7: Load Defaults, F10: Save, and F12: Save and Exit.

Please select Array Configuration

The screenshot shows the HPE System Configuration utility interface, specifically the "HPE Smart Array P408i-p SR Gen10" configuration screen. The left sidebar displays the same server information as the previous screenshot. The main content area is titled "HPE Smart Array P408i-p SR Gen10" and shows several configuration options: Controller Information, Configure Controller, Array Configuration (highlighted with a yellow callout box), Disk Utilities, Set Bootable Device(s) for Legacy Boot Mode, Administration, and Exit and launch Smart Storage Administrator (SSA). The "Array Configuration" option is highlighted, and a yellow callout box provides a description: "Creates new array(s) from the list of drives available and manages the existing arrays".

Please select "Create Array".

Hewlett Packard Enterprise System Configuration

System Utilities > System Configuration > **Create Array** > Array Configuration

Array Configuration

Array Configuration

Creates an array from the group of selected physical drives of same type. Once an array is created, the unused space is available for creating logical drives. SAS-SAS/SATA-SATA combination is only allowed. Mixed combination like SAS-SATA is not allowed.

Create Array (highlighted)

Create SmartCache Array

Manage Arrays

HPE ProLiant DL380 Gen10
Server SN: JPN930001N
iLO IPv4: 10.163.75.33
iLO IPv6: FE80::0AF1:EAFF:FE98:4E1A
User Default: OFF

Please choose both SSD disk which is installed rear side.

Hewlett Packard Enterprise System Configuration

More Forms > HPE Smart Array P408i-p SR Gen10 > Array Configuration > **Create Array**

Create Array

Port:1l Box:6 Bay:1 Size:960.1 GB SATA-SSD ATA Micron_5300_MTFD

Port:1l Box:6 Bay:2 Size:960.1 GB SATA-SSD ATA Micron_5300_MTFD

[Proceed to next Form] (highlighted)

HPE ProLiant DL380 Gen10
Server SN: JPN930001P
iLO IPv4: 10.163.75.32
iLO IPv6: FE80::0AF1:EAFF:FE98:4D30
User Default: OFF

Please choose RAID 1.

Hewlett Packard Enterprise System Configuration

More Forms > Array Configuration > Create Array > **Set RAID Level**

Set RAID Level

RAID Level

[Proceed to next Form] (highlighted)

RAID 1 (selected in dropdown)

RAID 0

RAID 1

HPE ProLiant DL380 Gen10
Server SN: JPN930001N
iLO IPv4: 10.163.75.33
iLO IPv6: FE80::0AF1:EAFF:FE98:4E1A
User Default: OFF

Hewlett Packard Enterprise System Configuration

More Forms > Array Configuration > Create Array > **Set RAID Level**

Set RAID Level

RAID Level

[Proceed to next Form] (highlighted)

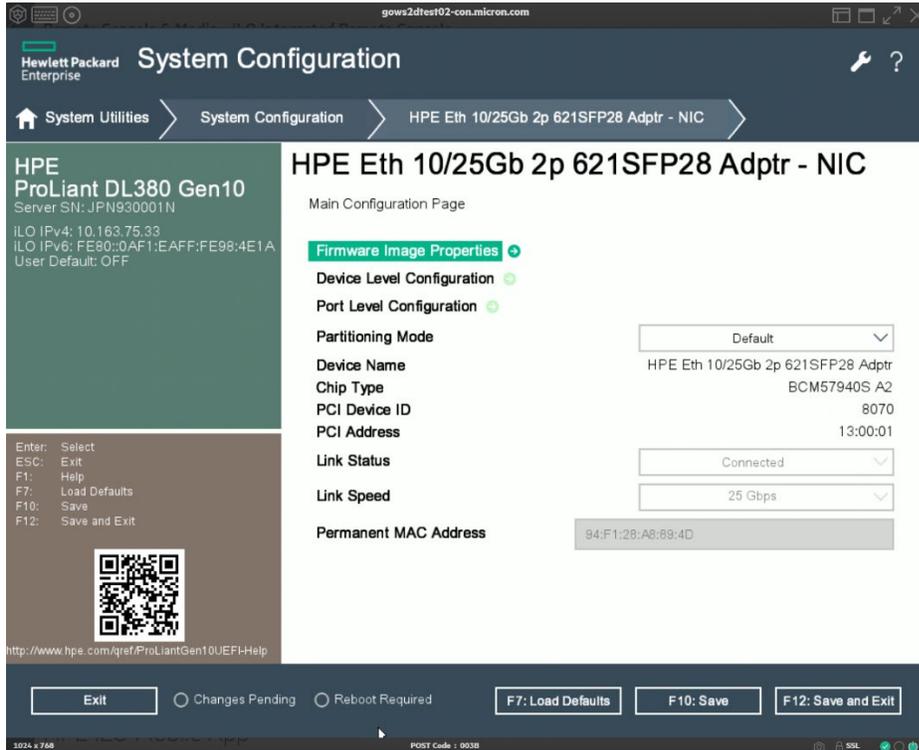
RAID 1 (selected in dropdown)

HPE ProLiant DL380 Gen10
Server SN: JPN930001N
iLO IPv4: 10.163.75.33
iLO IPv6: FE80::0AF1:EAFF:FE98:4E1A
User Default: OFF

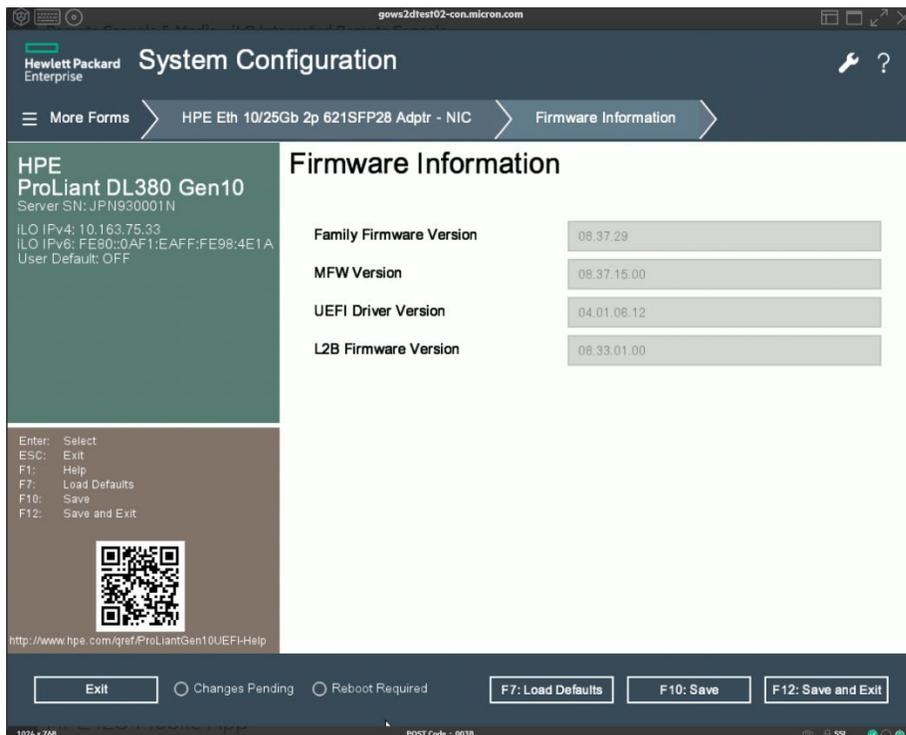
If you would like to label, please add what you want. Click F12: Save and Exit

Please confirm the result on Logical Drive Details screen.

Please select 25GbE in “Link Speed” if you use 25GbE NIC.



Please check the firmware version. I recommend you install latest one (refer to the HPE web page).



Please confirm the following points in your BIOS setting if you are not using the HPE ProLiant Gen10 model. The Gen10 model will optimize the setting automatically and does not need much configuration.

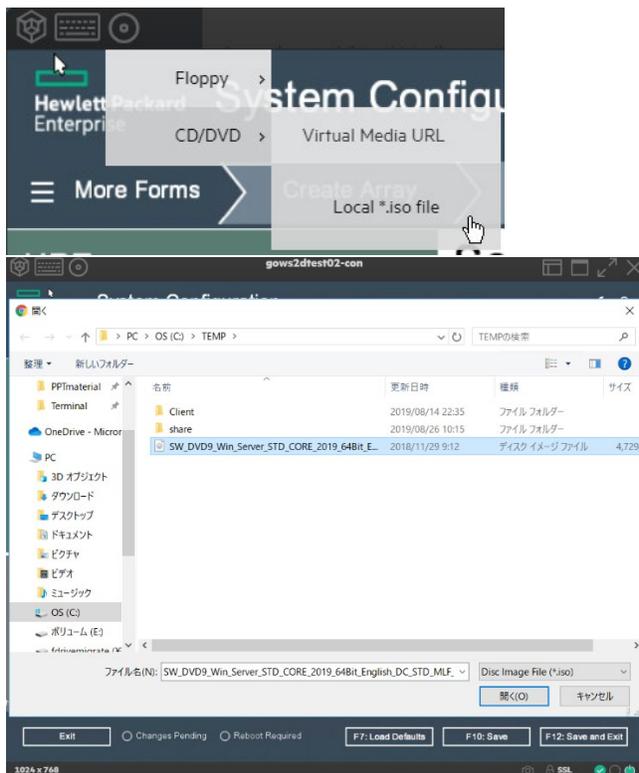
1. BIOS
2. HBA mode
 - ① Gen10 will optimize the setting well. but you need to set it up as HBA mode (pass through setting) on Gen8 or Gen9.

OS Installation

HPE ProLiant DL380 Gen 10 has an iLO console. If you are not familiar with iLO, please refer to:

- English
 - http://itdoc.hitachi.co.jp/manuals/ha8000v/hard/Gen10/iLO/880740-004_en.pdf
- Japanese – 日本語
 - https://h50146.www5.hpe.com/lib/products/servers/proliant/manuals/880740-191_ja.pdf

Please access the iLO console and mount the OS installation ISO file.



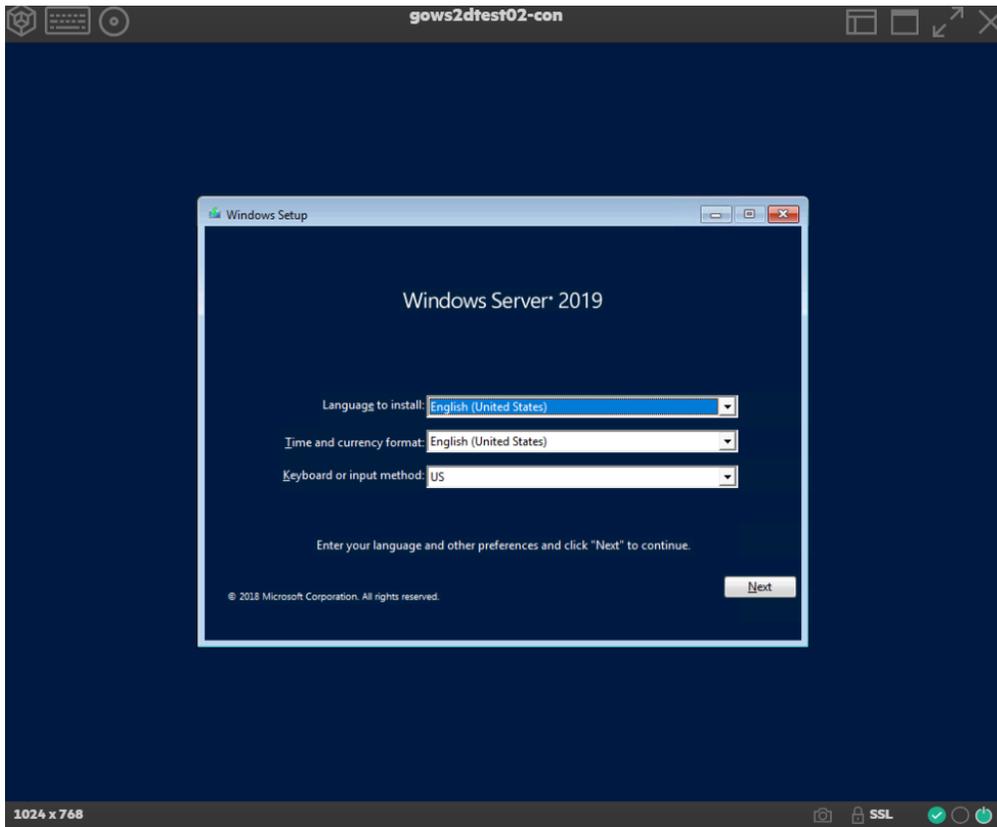
Press any key (space key is fine)



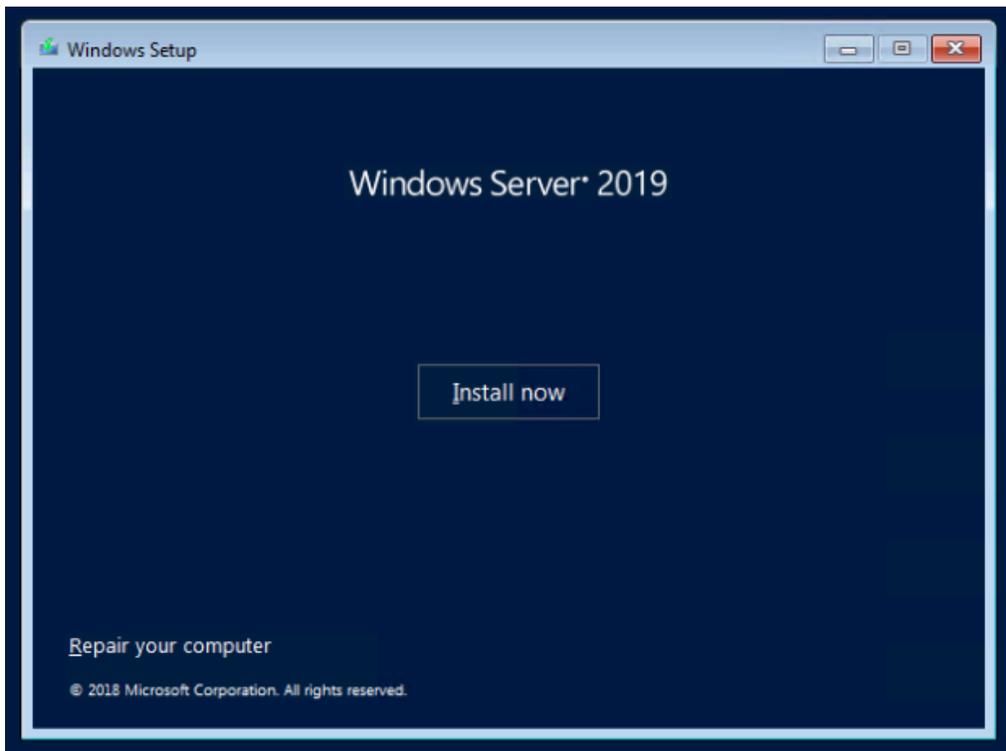
Please wait several minutes.



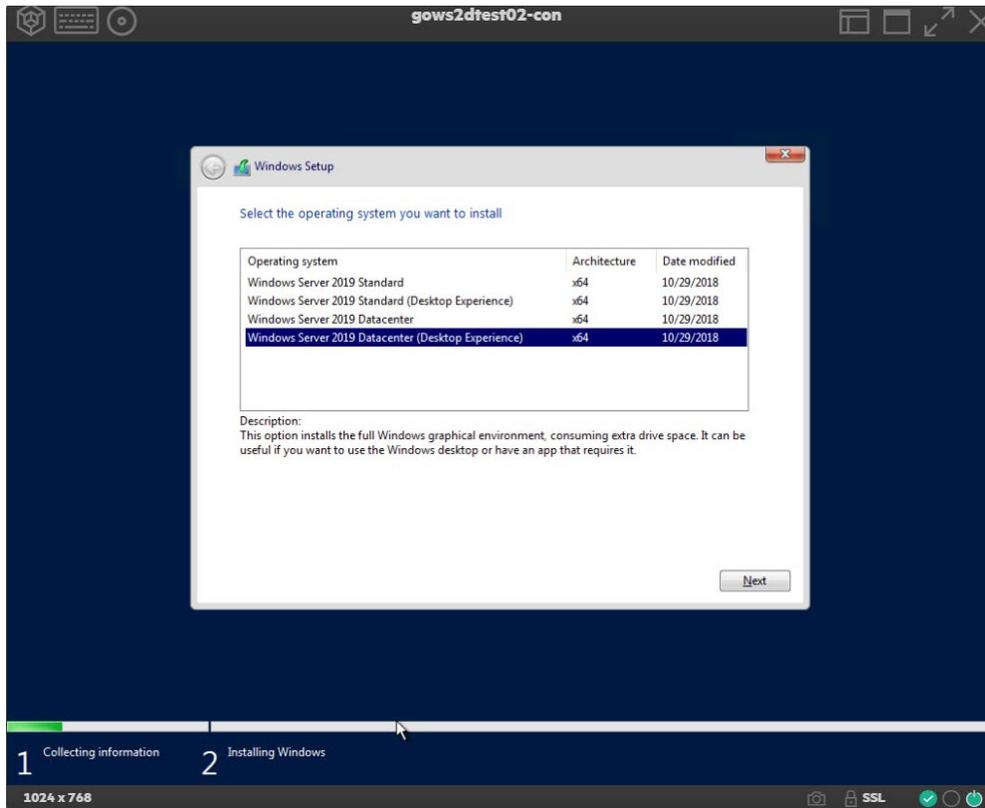
Please choose your preferred setting.



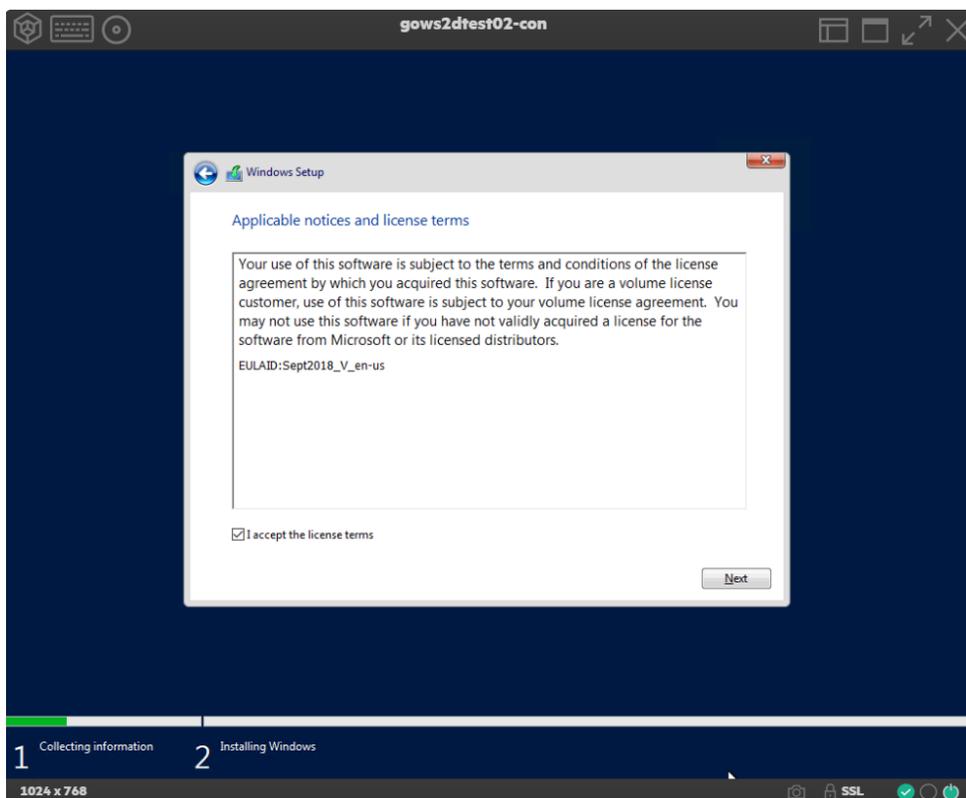
Please click "Install now".



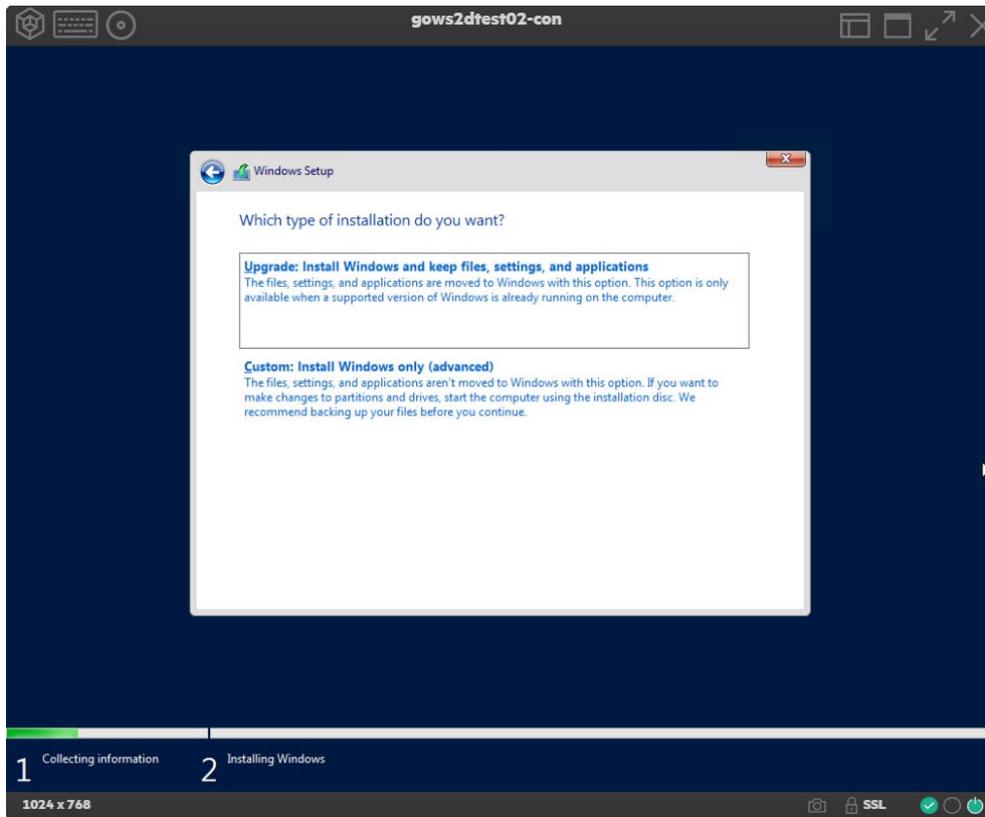
Please click “Windows Server 2019 Datacenter Experience”. The edition can support S2D.



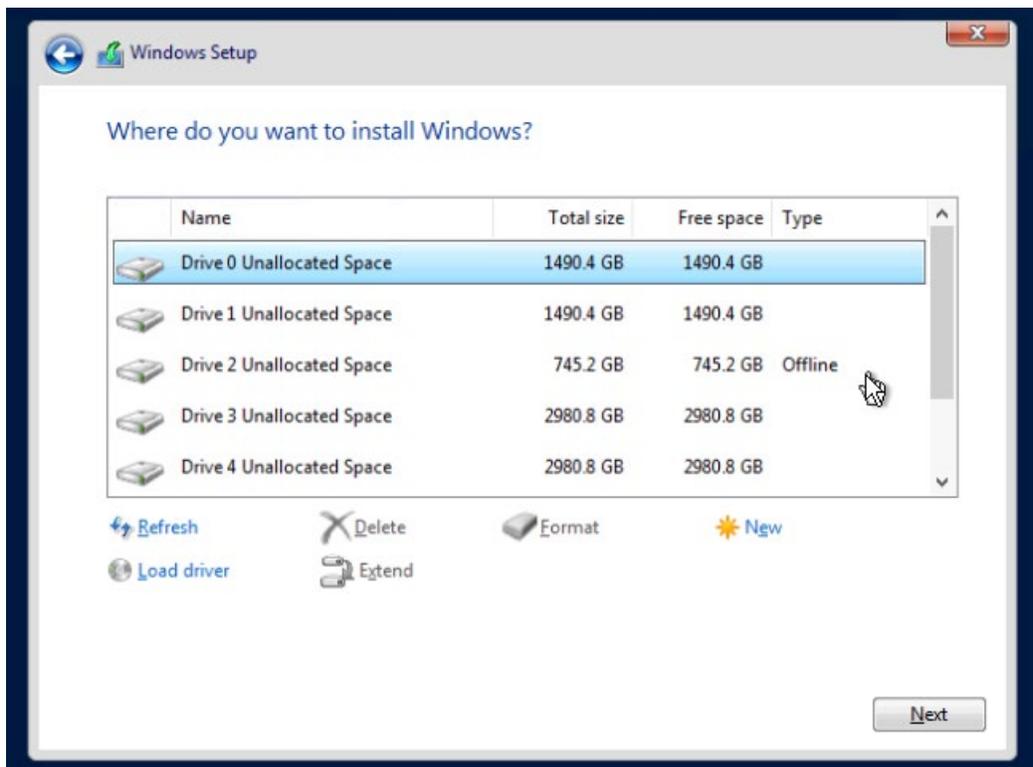
Please check “I accept the license terms”. Then, click “Next”.

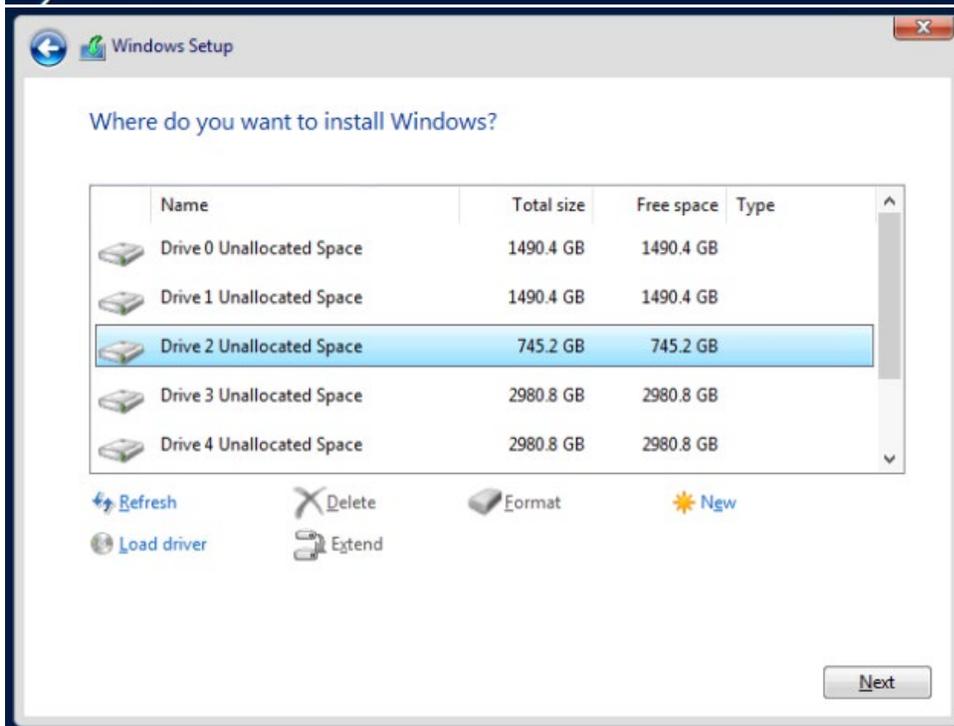
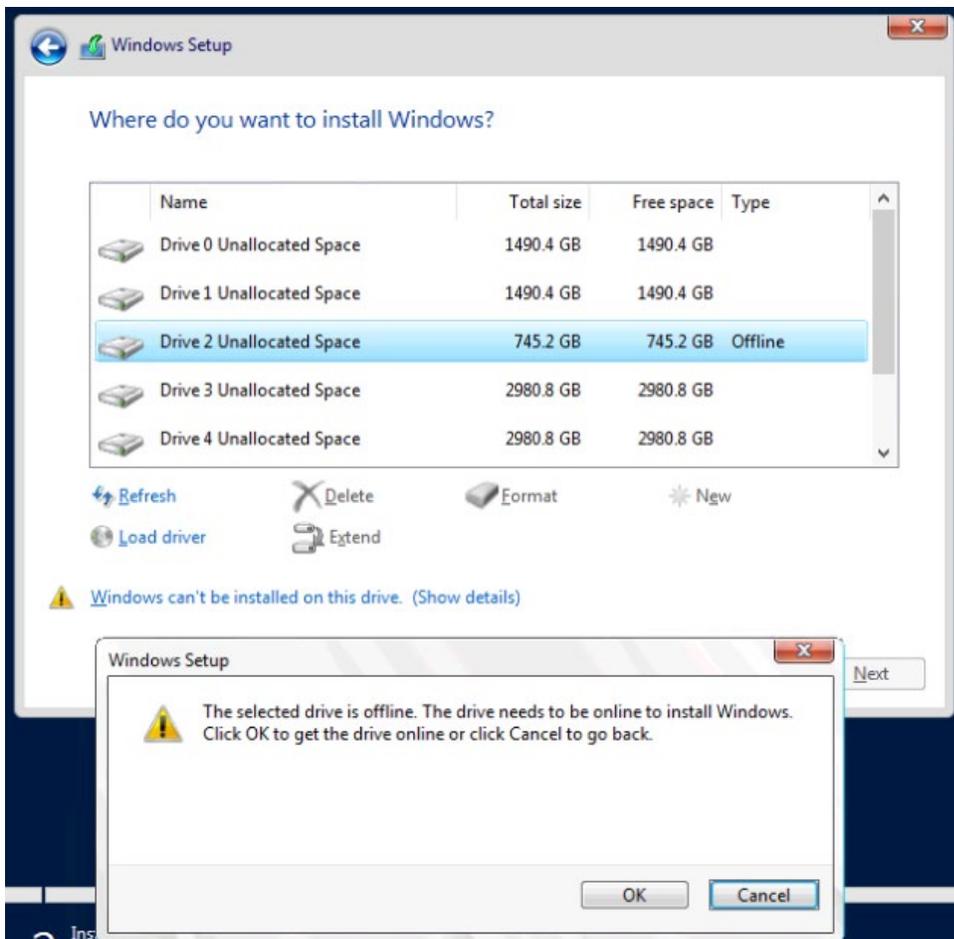


Please choose “Custom: Install Windows only(advanced)”.



The OS disk space is where you configure RAID 1 with rear SSD disks.

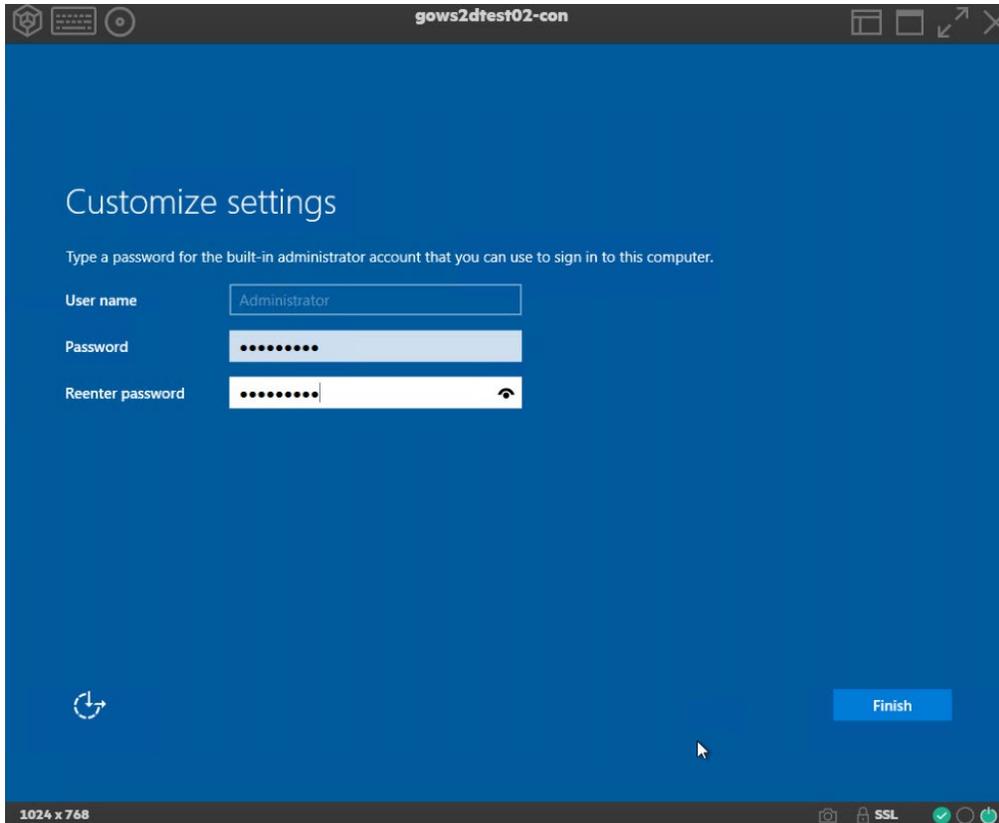




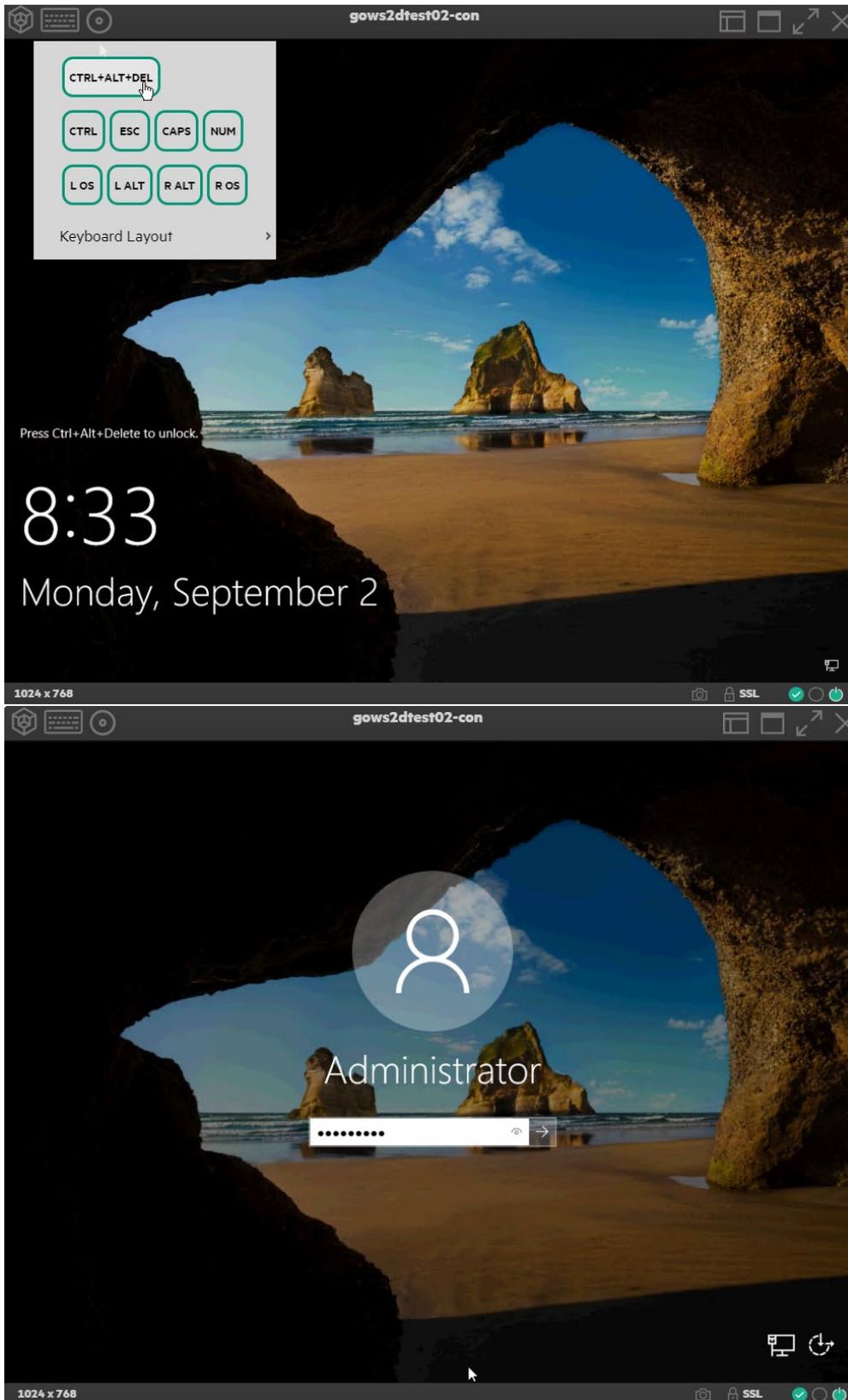
Please wait for 25 minutes.



Please put in the password for local Administrator.

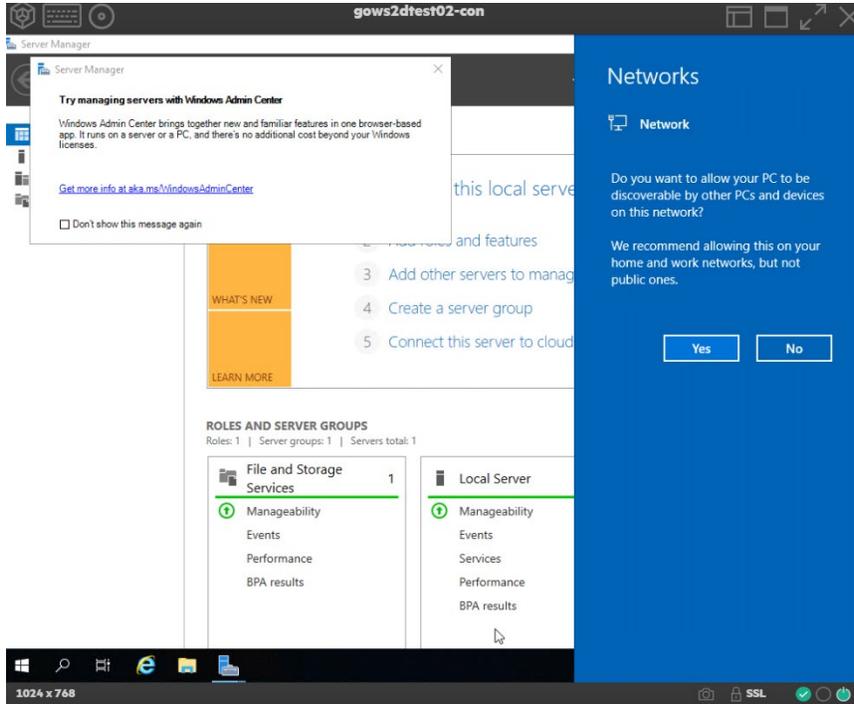


Please login new server.

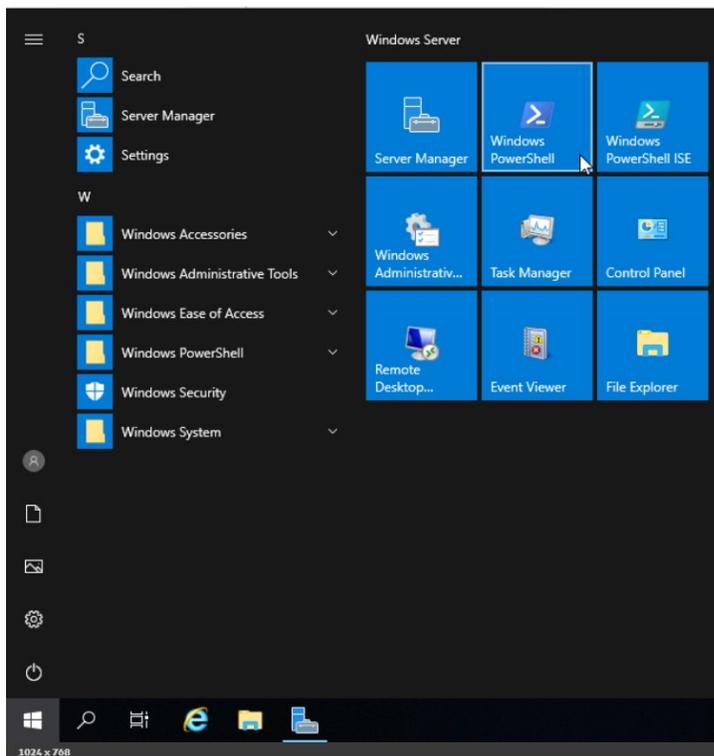


Network Information

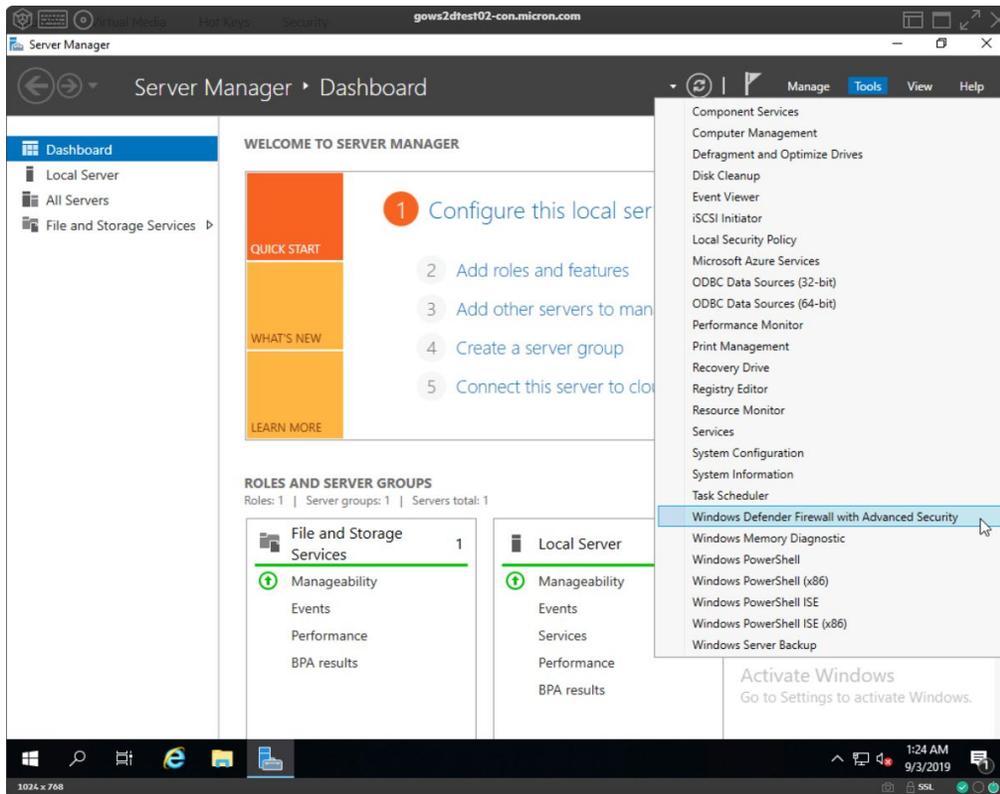
If you are using a company network, you can click “Yes”. But be sure to follow your company’s security policy.



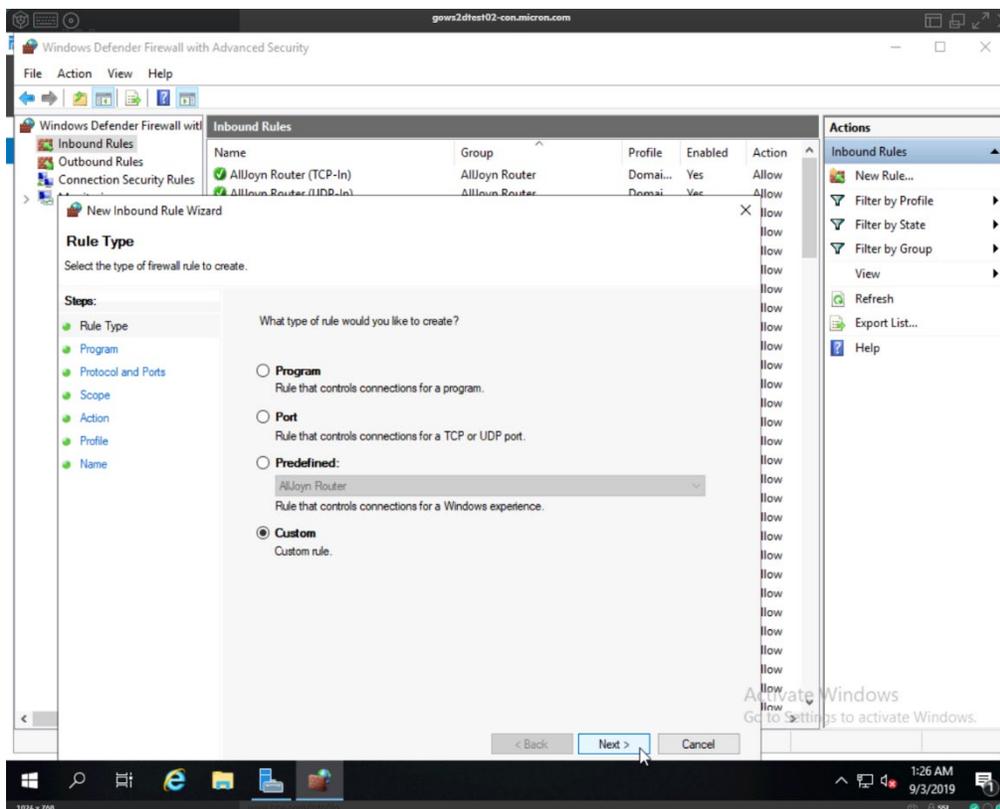
Please open Server Manager from the Start menu.



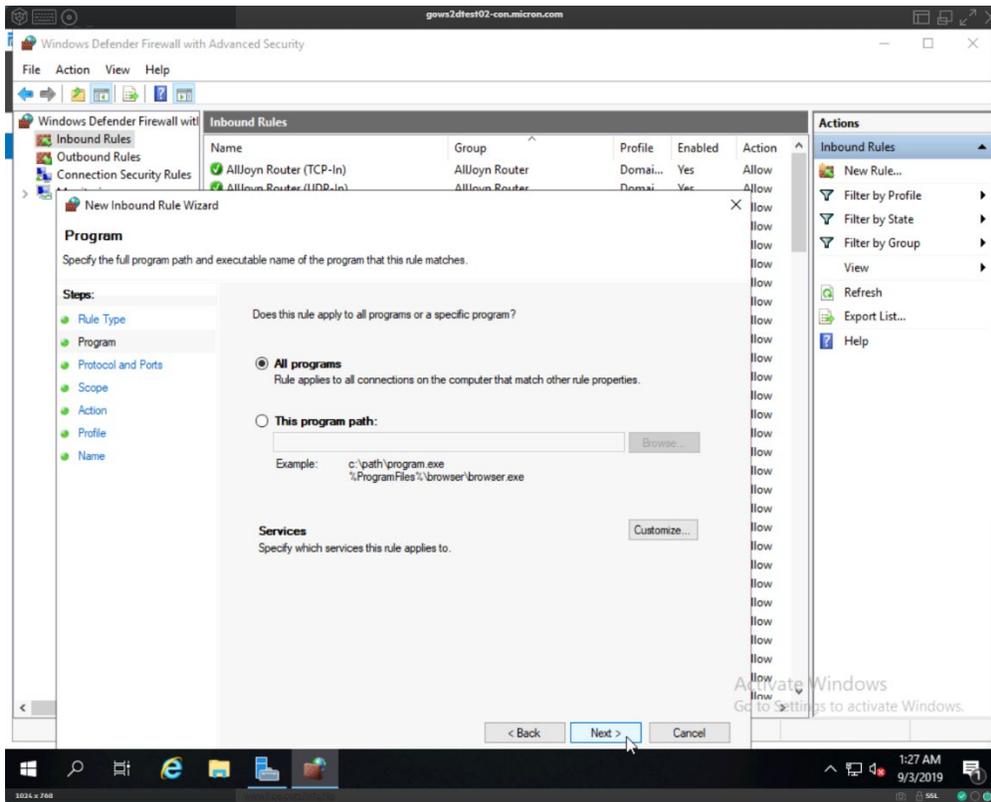
Please choose “Windows Defender Firewall with Advanced Security” from Tools.



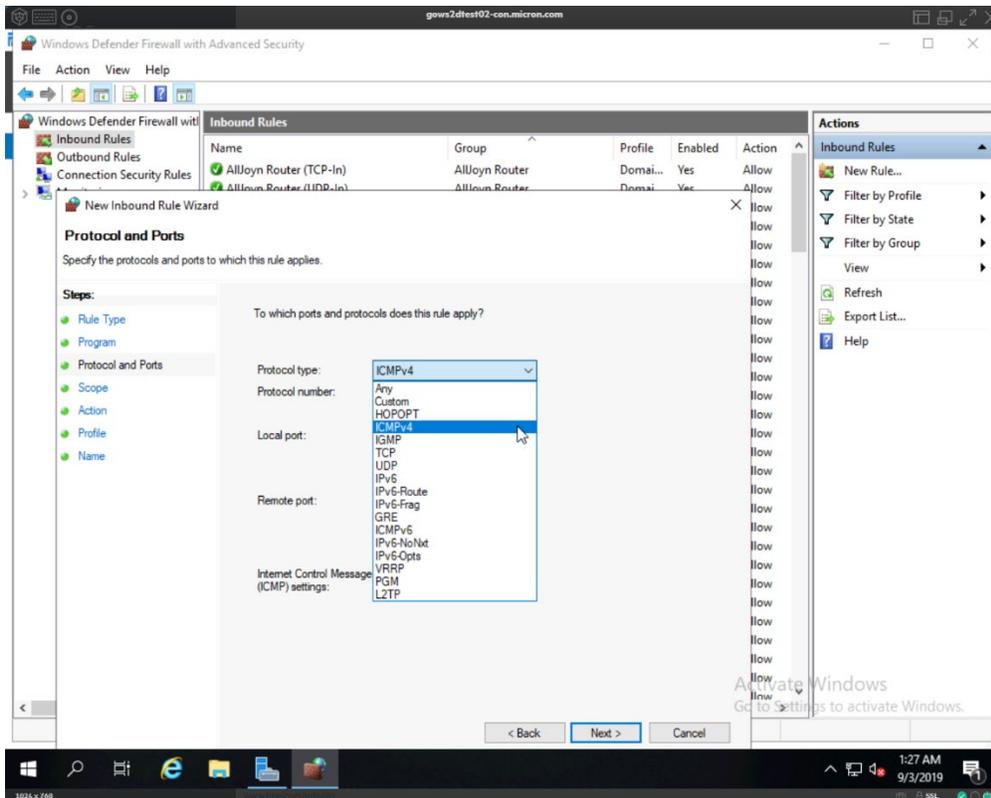
Please click “Inbound Rules” and click “New Rule...”. Select “Custom”.



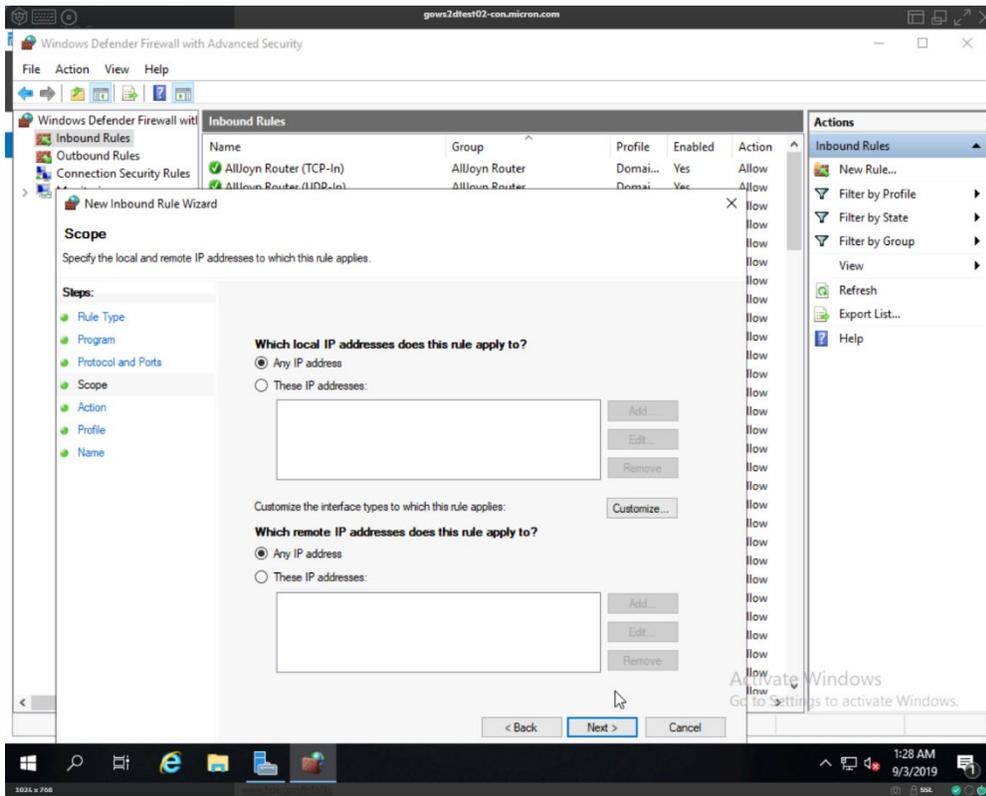
Pls select "All Programs".



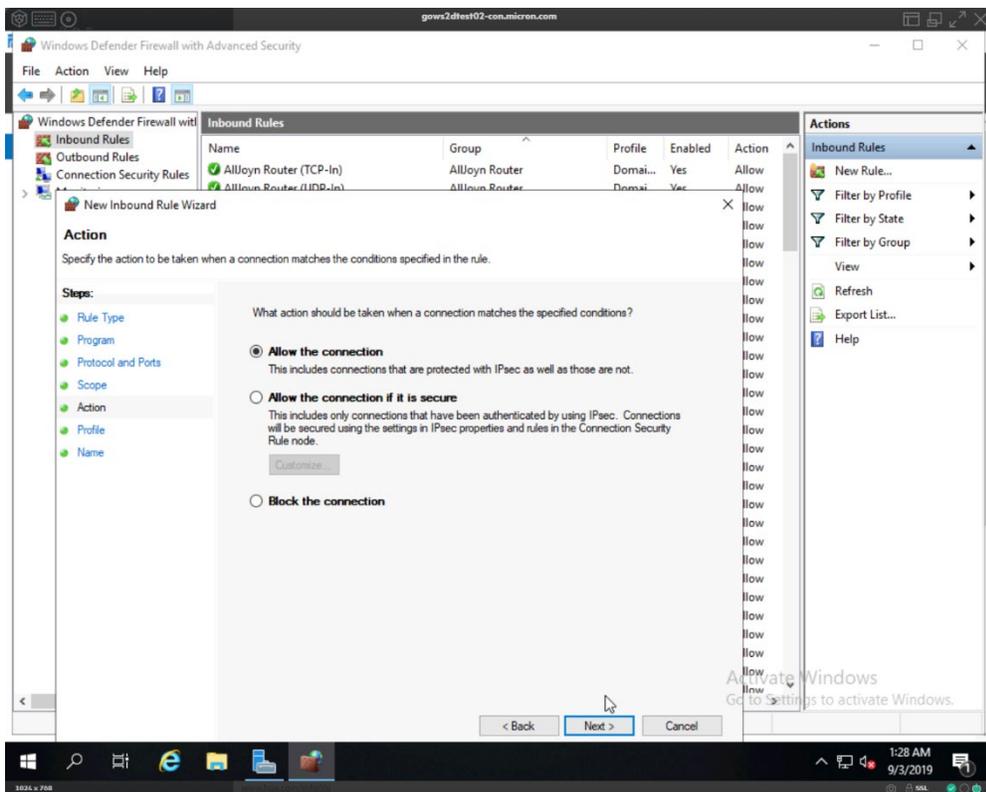
Please select ICMPv4 as below.



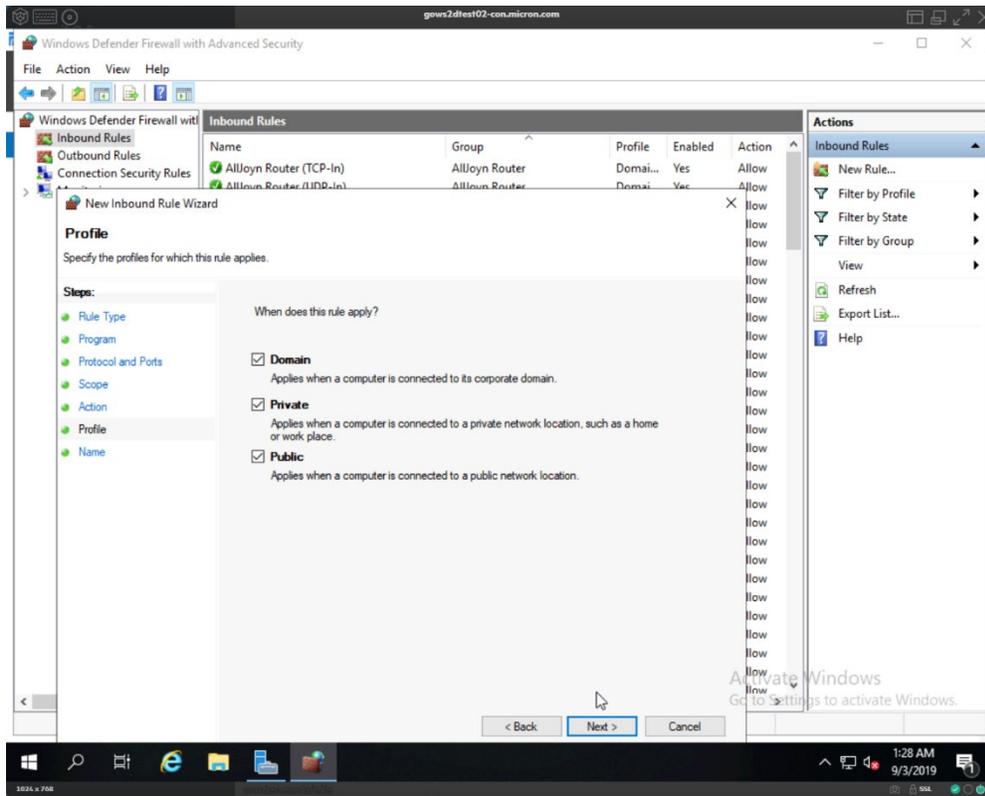
Please click "Next".



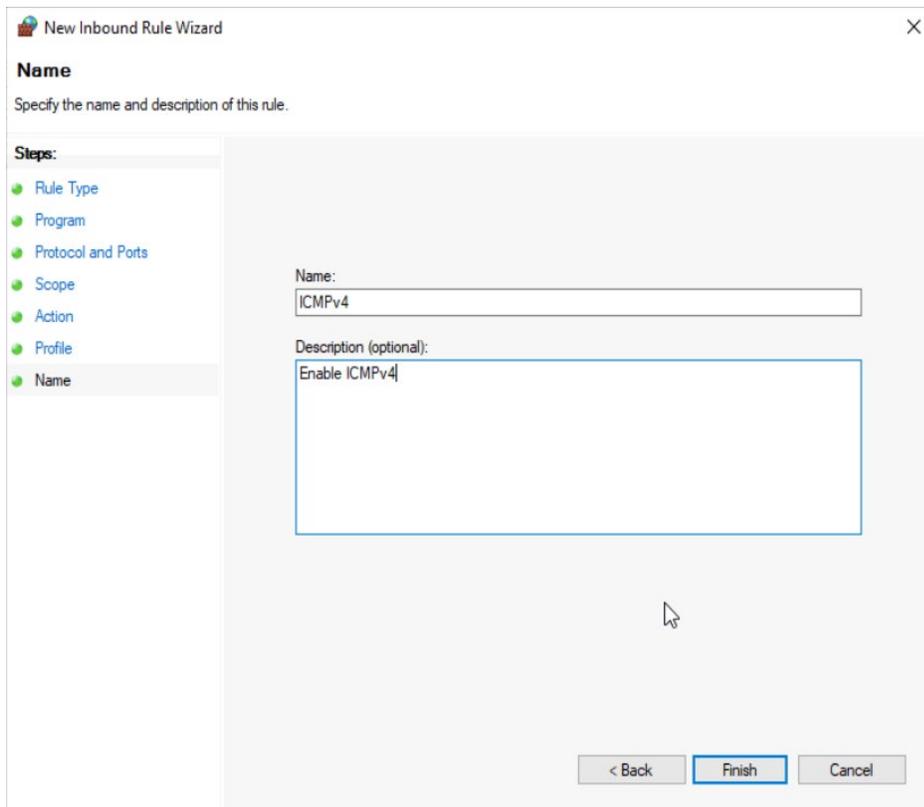
Please click "Next".



Please check “Next”.



Please put “ICMPv4” in Name field and add the description. Please click “Finish”.



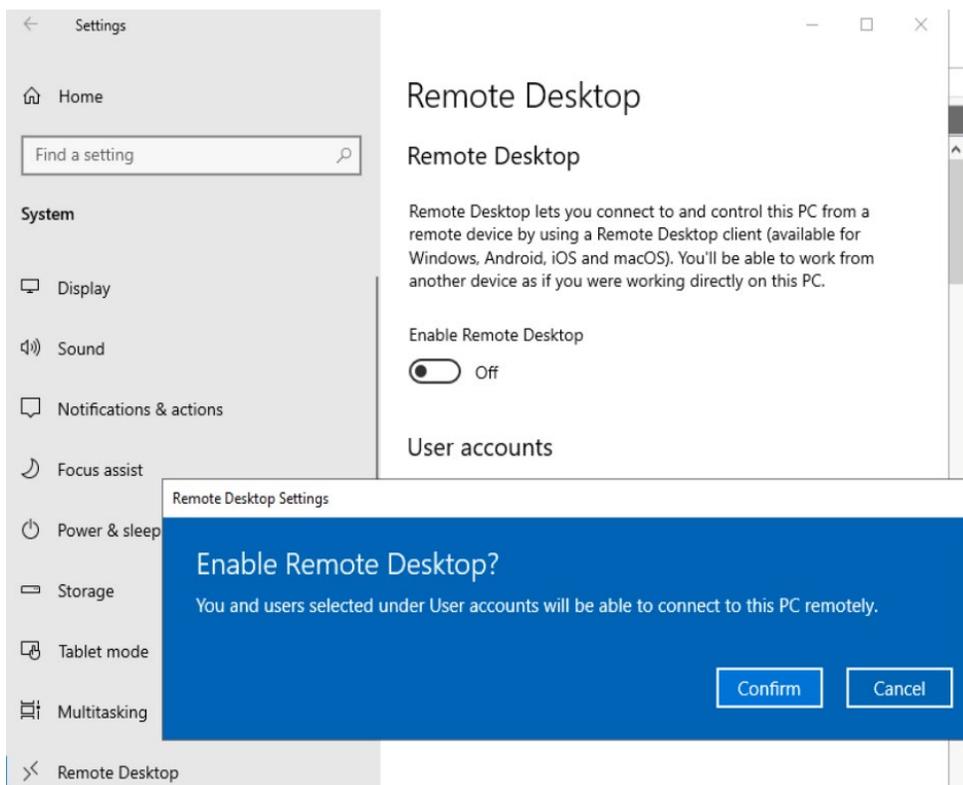
Confirm the results in this screen. You can ping the host now.

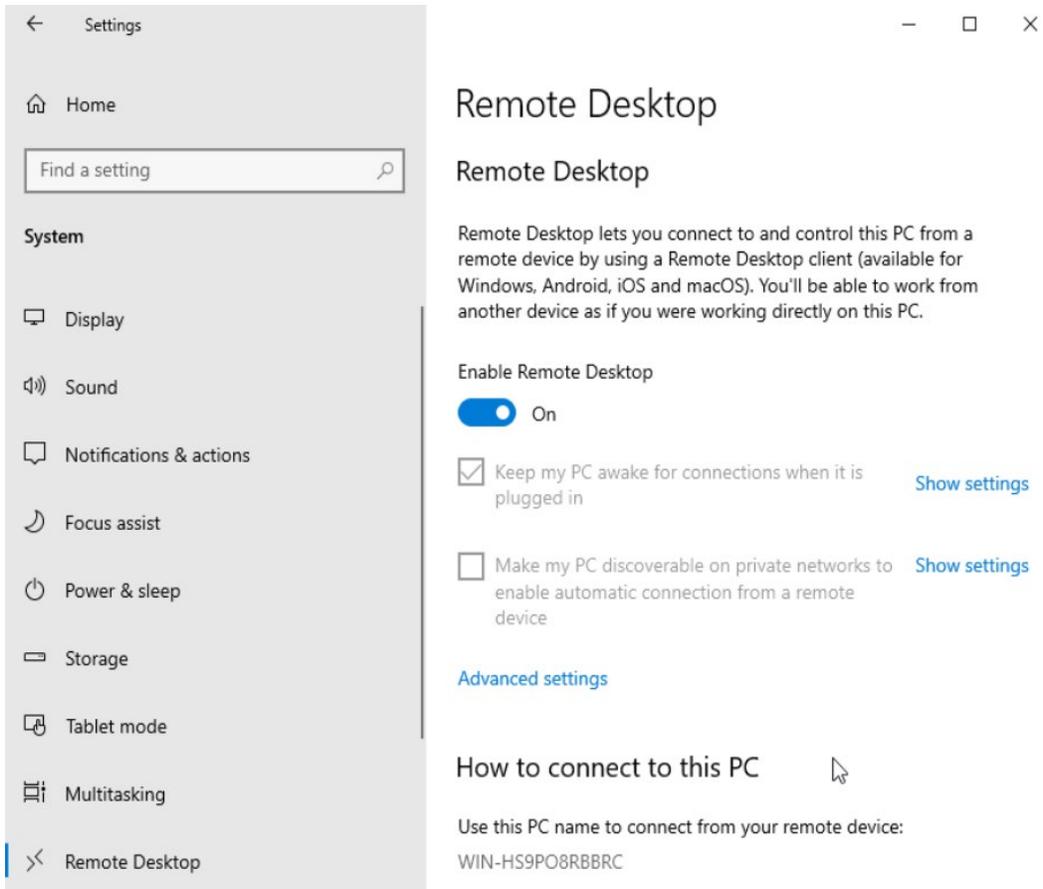
```
PS C:\Users\Administrator> Get-NetFirewallRule | Where-Object DisplayName -Like 'ICMPv4'

Name                : {C77CF116-B080-4133-BF10-DCBDE7F92C2D}
DisplayName          : ICMPv4
Description          : Enable ICMPv4
DisplayGroup        :
Group                :
Enabled              : True
Profile              : Domain, Private
Platform            : {}
Direction           : Inbound
Action               : Allow
EdgeTraversalPolicy  : Block
LooseSourceMapping   : False
LocalOnlyMapping     : False
Owner                :
PrimaryStatus        : OK
Status               : The rule was parsed successfully from the store. (65536)
EnforcementStatus    : NotApplicable
PolicyStoreSource    : PersistentStore
PolicyStoreSourceType : Local

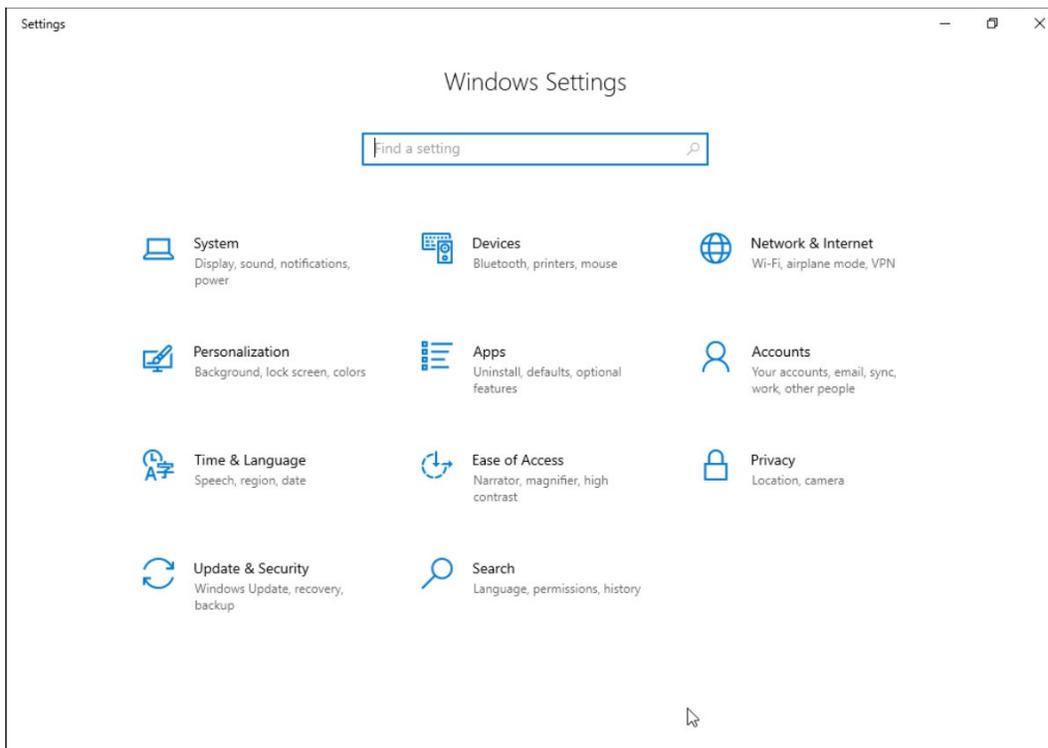
PS C:\Users\Administrator>
```

Please click “Setting” from the Start menu, and click “System”. Choose “Remote Desktop”. Please enable Remote Desktop as below, which you can access through Remote desktop now.

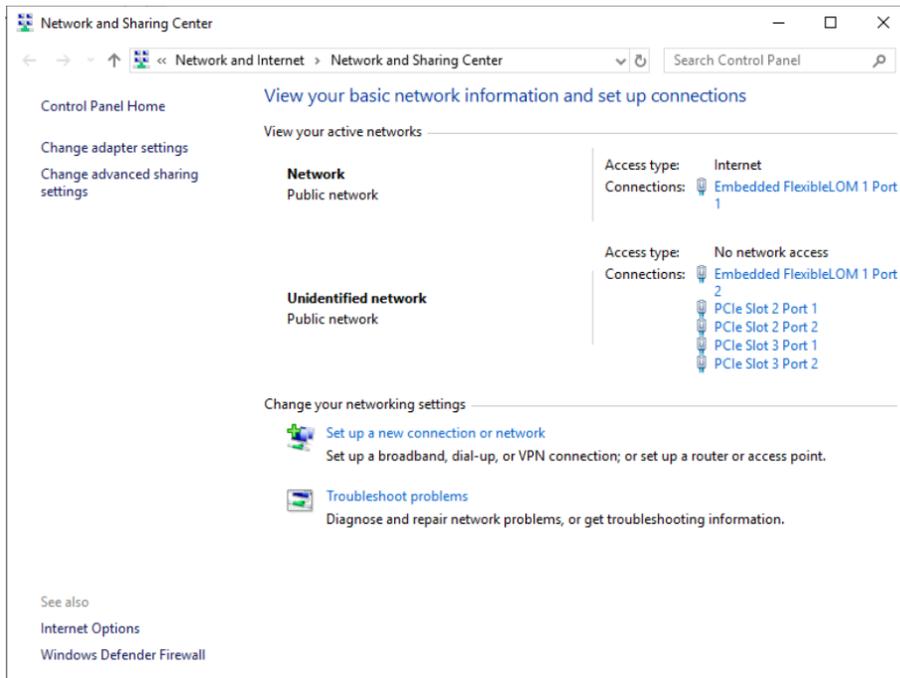




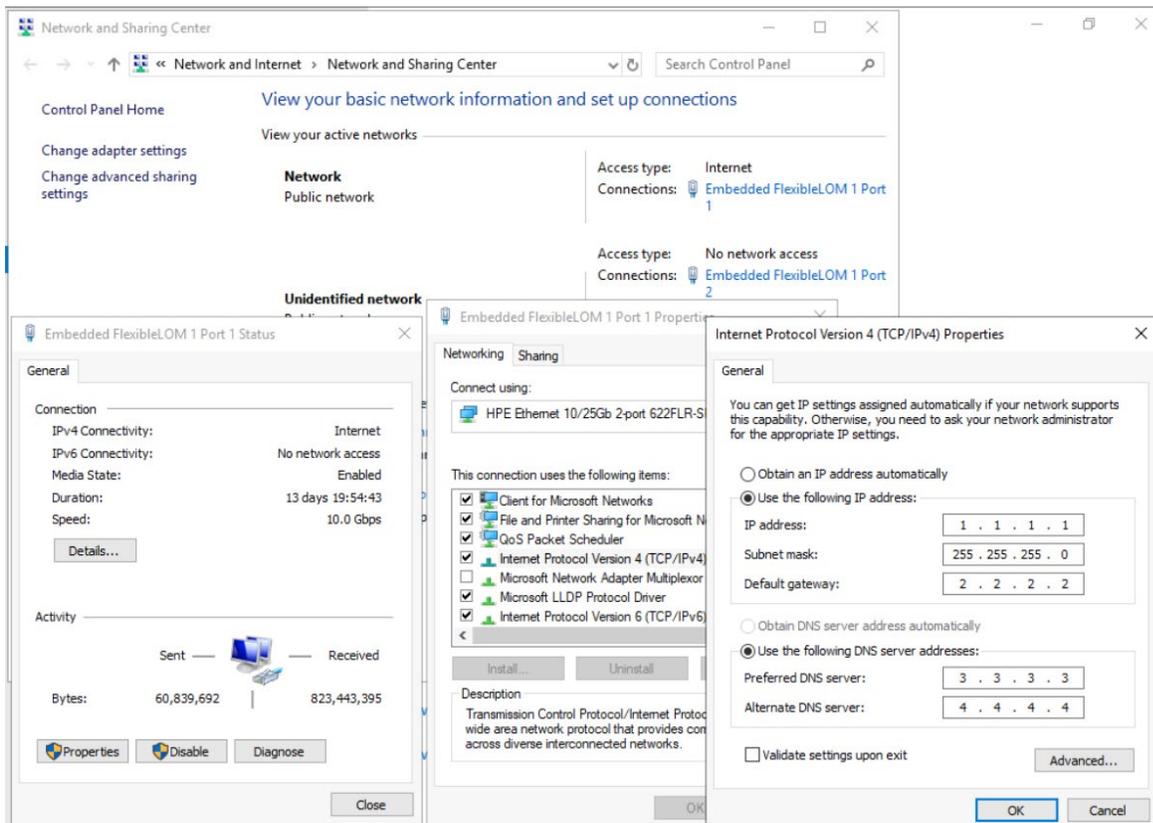
Please click “Network & Internet” under your Windows settings.



Please move to Network and Sharing Center. Please configure static IP address.



Please click “Embedded FlexibleLOM 1 Port 1”.



Note: If you cannot ping from another server or client, try to enable “Public” in ICMPv4 inbound rule.

Update Firmware and Driver Using Latest HPE SPP

You can download latest SPP from:

HTTPS Access: <https://ftp.ext.hpe.com/hprc>

Login ID: sppgen10

Password: g0_Cstm+

If you need to use FTP access, use this link. ftp://sppgen10:g0_Cstm+@ftp.ext.hpe.com

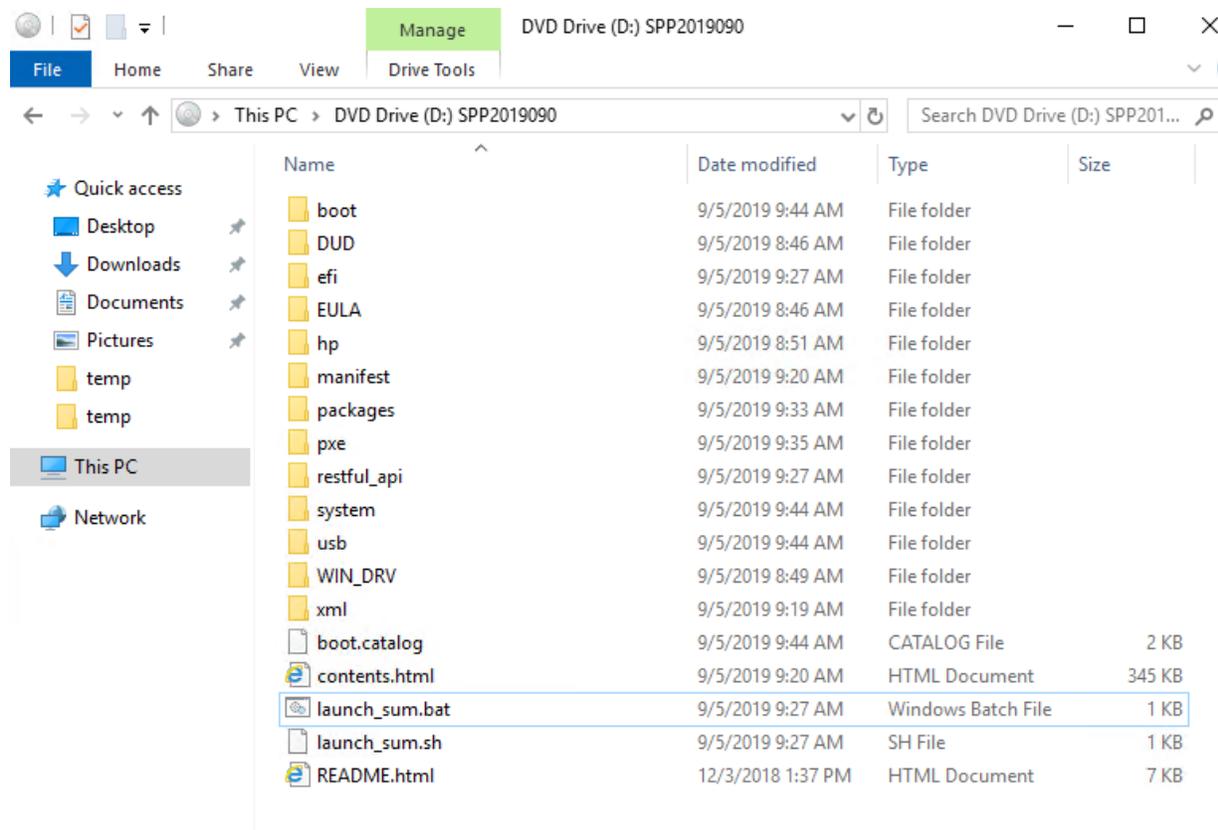
Folder name: Gen10_SPP

File name: P26941_001_gen10spp-2020.03.0-SPP2020030.2020_0402.3.iso

If you would like to use previous version, access Old_SPP folder.

The ISO enables online updates. Please mount the ISO on your Windows Server and launch it to update your firmware and driver.

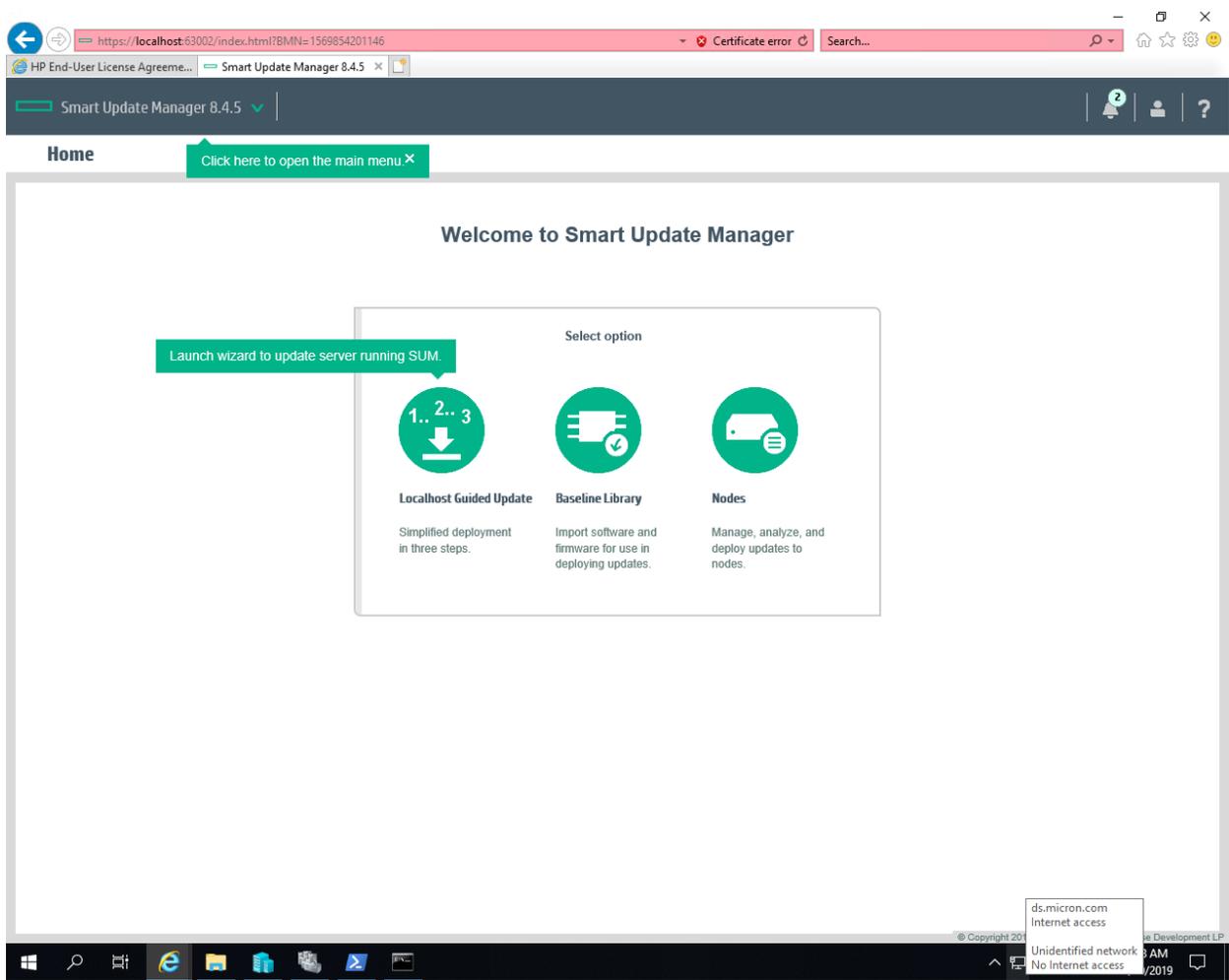
Please run “launch_sum.bat”.



You will see below.

```
C:\Windows\system32\cmd.exe - D:\packages\smartupdate.bat
D: is a CD-ROM Drive
Copying SUM files from "D:\packages\" to "C:\Users\Administrator\AppData\Local\localsum"
31 File(s) copied
2347 File(s) copied
66 File(s) copied
1 File(s) copied
1 File(s) copied
1 File(s) copied
1 File(s) copied
iLO Channel Interface (CHIF) Driver will be installed on Windows nodes, if it is not already present. This will help ensure complete inventory and recommended updates.
sum_service_x64.exe started successfully on port 63001 and secure port 63002. FTP is disabled.
```

Please click "Localhost...".



I have used “Automatic” and “Baseline…”.

Localhost Guided Update



Select deployment mode

Automatic mode will inventory and deploy all applicable updates without user interaction on the system running SUM.

Mode

Mode Interactive Automatic

Baseline or Install Set iLO Installation Queue

Baseline selection

(Optional) Select an already added baseline and/or additional package to apply to this node. The location from where SUM is running is used as the default.

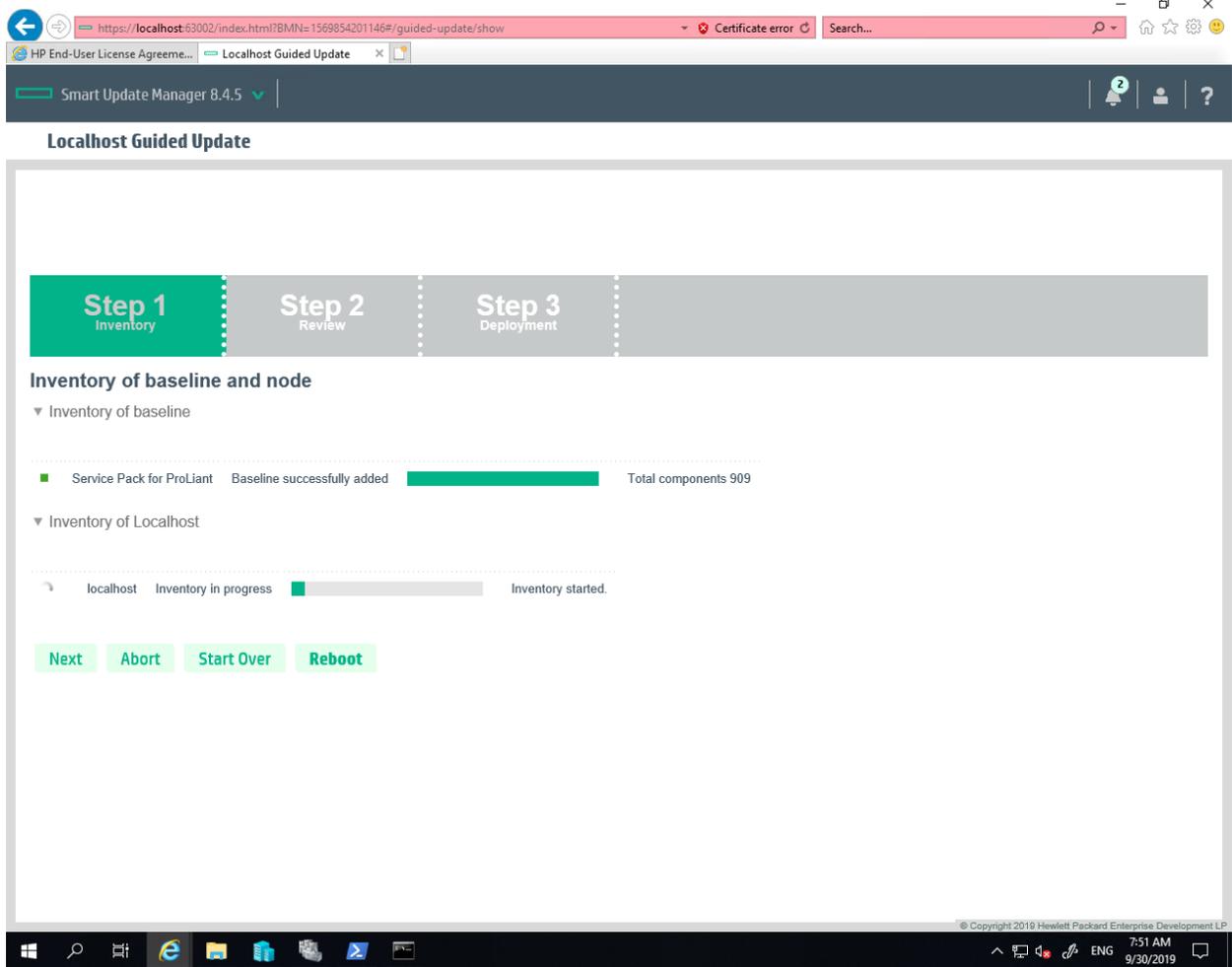
Current baseline
selected

Current additional
package

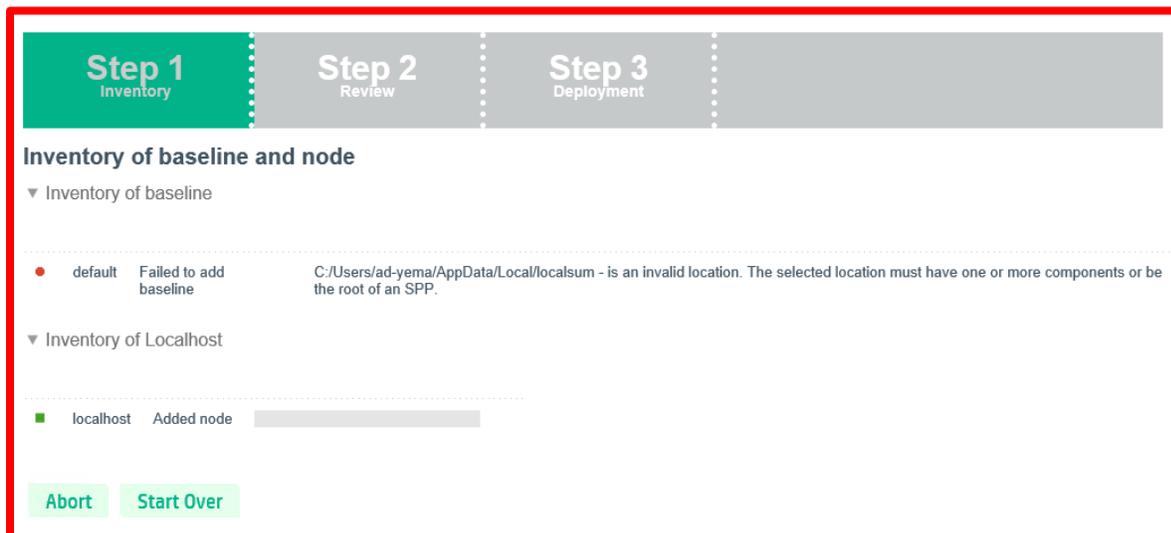
Assign different baseline

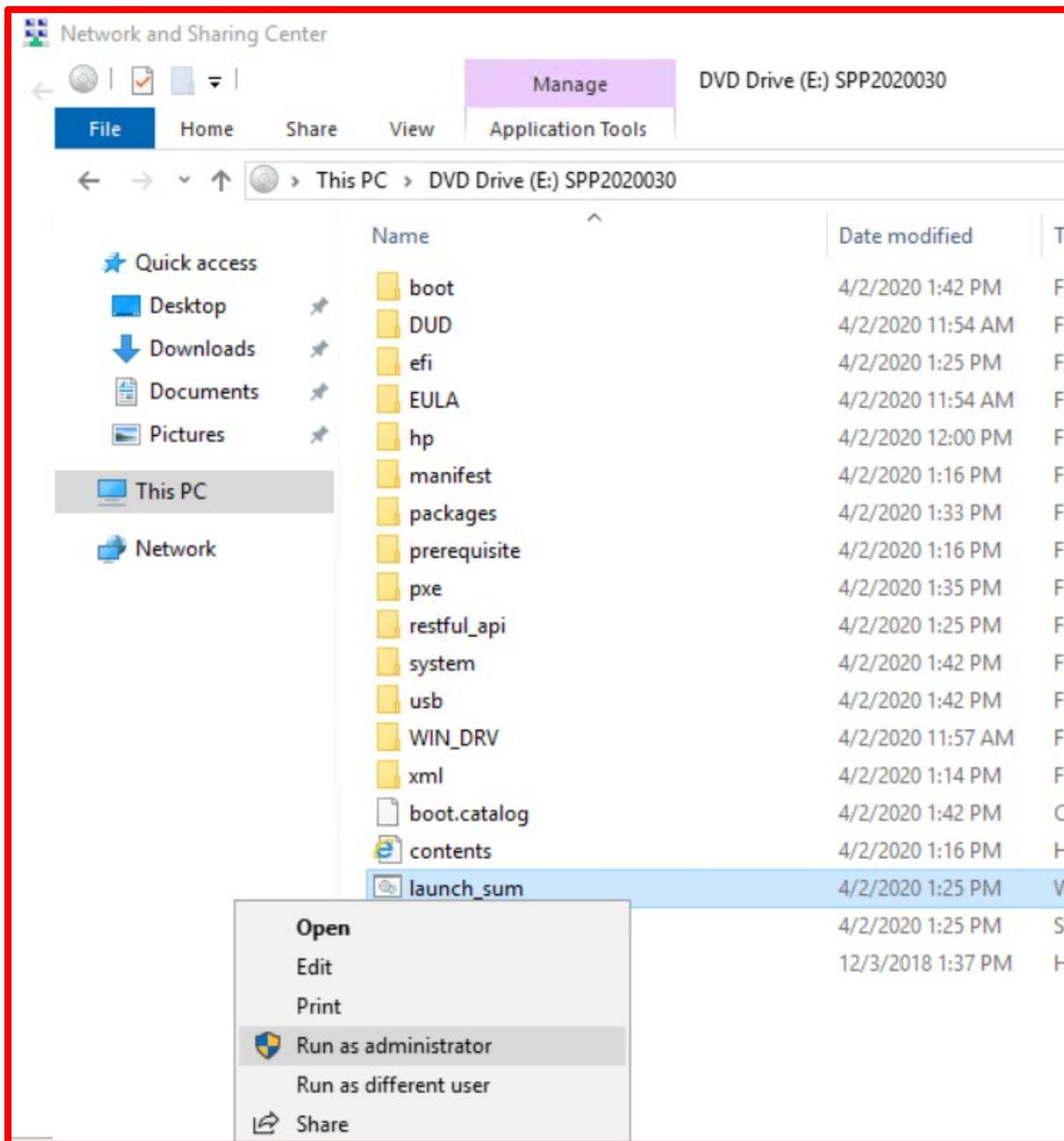
OK

Cancel



Troubleshooting: When you see the screen below “Failed”, you must use “lanch_sum.bat” with “Run as administrator”.





If you would like to check the detail before clicking “Next”. Please follow it.



Please click Generate after select report type.

Reports ?

Select Report Types

- Inventory
- Firmware details
- Deploy preview
- Failed dependency details
- Deploy details
- Combined report

Select Report Format

- HTML
- XML
- CSV

Advanced Report Options

Set report output path:

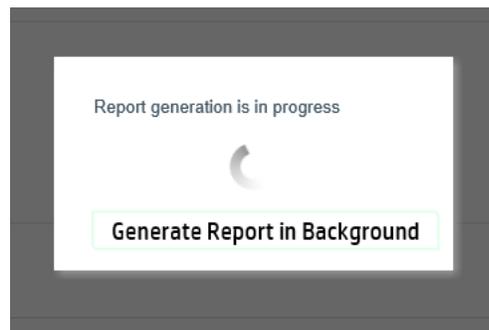
Browse or manually enter a directory path where the reports should be generated.

Enter directory path

- Generate Report in Background

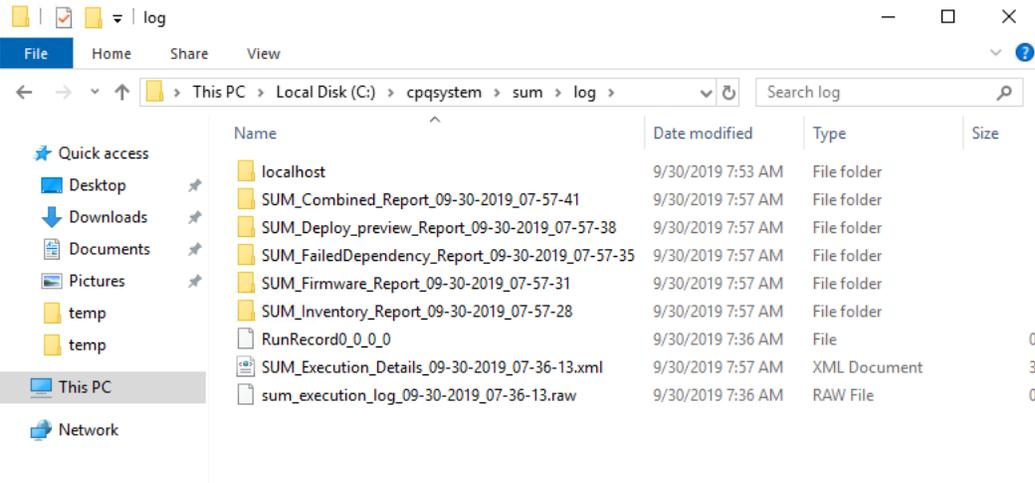
Reports Center

Generated	Report	Firmware	Deploy	Deploy	Failed	Inventory	Combined	Format	Node	Status
-----------	--------	----------	--------	--------	--------	-----------	----------	--------	------	--------

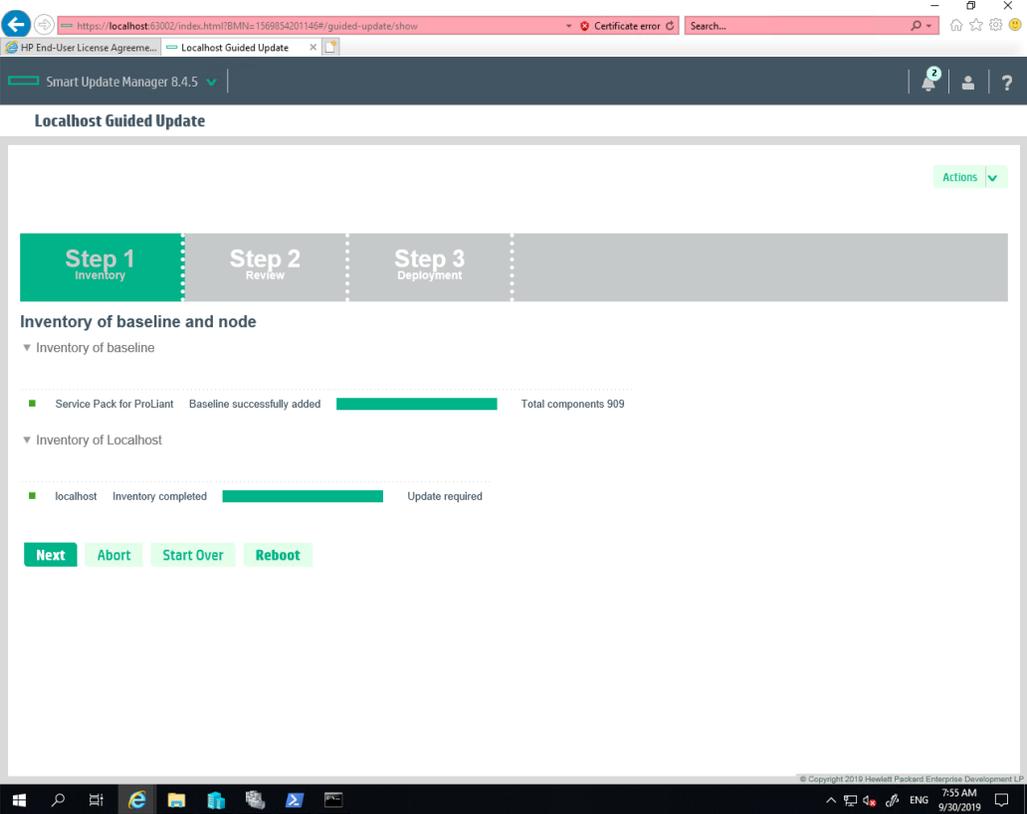


Reports Center

Generated At	Report Path	Firmware	Deploy preview	Deploy details	Failed Dependency	Inventory	Combined report	Format	Node(s)	Status
Sep-30-2019 07:57:45:571 am	C:\cpqsystem\sum\log							html	localhost	Completed



Please click “Next”.



Please review below.

Localhost Guided Update

Step 1 Inventory | **Step 2 Review** | Step 3 Deployment

Deployment summary

▼ localhost - applicable components

ILO Install Set management options

- Save Components as an Install Set on ILO Repository
- Update the existing recovery set with components (BIOS, ILO, IE, ME, CPLD) from this run

Applicable Components: 25
Suggested Components: 19
Selected Components: 19

Select all Deselect all

Search:

Select Components	Package	Ready to proceed	Type	Criticality	Installed Version	Available Version	Reboot Required
<input checked="" type="checkbox"/>	Online ROM Flash Component for Windows x64 - HPE Integrated Lights-Out 5 (cp040393)	<input checked="" type="checkbox"/>	Firmware	Recommended	1.43	1.45	No
<input checked="" type="checkbox"/>	Online ROM Flash for Windows x64 - Advanced Power Capping Microcontroller Firmware for HPE Gen10 Servers (cp040538)	<input checked="" type="checkbox"/>	Firmware	Optional	View Details	1.0.7	Optional
<input checked="" type="checkbox"/>	NVMe Drive Eject NMI Fix for Intel Xeon Processor Scalable Family for Windows (cp034635)	<input checked="" type="checkbox"/>	Software	Optional		1.1.0.0	Required

Localhost Guided Update

Select Components	Package	Ready to proceed	Type	Criticality	Installed Version	Available Version	Reboot Required
<input checked="" type="checkbox"/>	Online ROM Flash Component for Windows x64 - HPE Integrated Lights-Out 5 (cp040393)	<input checked="" type="checkbox"/>	Firmware	Recommended	1.43	1.45	No
<input checked="" type="checkbox"/>	Online ROM Flash for Windows x64 - Advanced Power Capping Microcontroller Firmware for HPE Gen10 Servers (cp040538)	<input checked="" type="checkbox"/>	Firmware	Optional	View Details	1.0.7	Optional
<input checked="" type="checkbox"/>	NVMe Drive Eject NMI Fix for Intel Xeon Processor Scalable Family for Windows (cp034635)	<input checked="" type="checkbox"/>	Software	Optional		1.1.0.0	Required
<input checked="" type="checkbox"/>	HPE Broadcom NX1 1Gb Driver for Windows Server x64 Editions (cp036186)	<input checked="" type="checkbox"/>	Driver	Optional	17.2.1.0	214.0.0.0	No
<input checked="" type="checkbox"/>	Agentless Management Service for Windows X64 (cp039663)	<input checked="" type="checkbox"/>	Software	Optional		1.44.0.0	Environment Dependent
<input checked="" type="checkbox"/>	HPE Smart Storage Administrator Diagnostic Utility (HPE SSADU) CLI for Windows 64-bit (cp038946)	<input checked="" type="checkbox"/>	Software	Optional		3.47.6.0	Optional
<input checked="" type="checkbox"/>	HPE Smart Storage Administrator (HPE SSA) for Windows 64-bit (cp038944)	<input checked="" type="checkbox"/>	Software	Optional		3.47.6.0	Optional
<input checked="" type="checkbox"/>	ILO 5 Channel Interface Driver for Windows Server 2016 and Server 2019 (cp039987)	<input checked="" type="checkbox"/>	Driver	Recommended	4.3.0.0	4.5.0.0	Environment Dependent
<input checked="" type="checkbox"/>	HP Lights-Out Online Configuration Utility for Windows x64 Editions (cp037416)	<input checked="" type="checkbox"/>	Software	Optional		5.3.0.0	No
<input checked="" type="checkbox"/>	ILO 5 Automatic Server Recovery Driver for Windows Server 2016 and Server 2019 (cp035140)	<input checked="" type="checkbox"/>	Driver	Optional		4.4.0.0	Environment Dependent
<input checked="" type="checkbox"/>	HPE Smart Storage Administrator (HPE SSA) CLI for Windows 64-bit (cp038945)	<input checked="" type="checkbox"/>	Software	Optional		3.47.6.0	Optional
<input checked="" type="checkbox"/>	HPE Smart Array Gen10 Controller Driver for Windows Server 2012 R2, Windows Server 2016, and Windows Server 2019 (cp040553)	<input checked="" type="checkbox"/>	Driver	Recommended		106.100.0.1014	Required

Localhost Guided Update

Selection	Component Name	Type	Recommendation	Version	Required	
<input checked="" type="checkbox"/>	HPE QLogic FastLinQ 10/25/50 GbE Drivers for Windows Server x64 Editions (cp035071)	Driver	Optional	8.33.20.103	8.37.37.0	No
<input checked="" type="checkbox"/>	Integrated Smart Update Tools for Windows x64 (cp039132)	Software	Recommended	2.4.5.0		No
<input checked="" type="checkbox"/>	Matrox G200eH3 Video Controller Driver for Windows Server 2016 and Server 2019 (cp038694)	Driver	Optional	9.15.1.224		Required
<input checked="" type="checkbox"/>	HPE Smart Array SR Event Notification Service for Windows Server 64-bit Editions (cp039146)	Software	Recommended	1.2.1.64		Required
<input checked="" type="checkbox"/>	Identifiers for Intel Xeon Processor Scalable Family for Windows Server 2012 R2 to Server 2019 (cp038754)	Driver	Optional	10.1.17861.8101		No
<input checked="" type="checkbox"/>	HPE QLogic FastLinQ Online Firmware Upgrade Utility for Windows Server x64 Editions (cp035083)	Firmware	Optional	View Details	5.1.4.0	Required
<input checked="" type="checkbox"/>	Online ROM Flash Component for Windows (x64) - HPE Smart Array P408i-p, P408e-p, P408i-a, P408i-c, E208i-p, E208e-p, E208i-c, E208e-c, P408i-sb, P408e-m, P204i-c, P204i-b, P816i-a and P416ie-m SR Gen10 (cp039215)	Firmware	Recommended	1.98	1.99	Required
<input type="checkbox"/>	Online ROM Flash Component for Windows x64 - HPE ProLiant DL380 Gen10 (U30) Servers (cp038505)	Firmware	Optional	U30 2.10 - (05/21/2019)	U30 2.10 - (05/21/2019)	Required
<input type="checkbox"/>	Online ROM Flash Component for Windows (x64) - V0000960JWTKB, V0001920JWTKL, V0003840JWTKN, V0007680JWTKP, MO000400JWTKBQ, MO000800JWTKBR, MO001600JWTKBT, MO003200JWTKBU, MO006400JWTKCD, EO000400JWTKBV, EO000800JWTKCA, EO001600JWTKCB Drives (cp039369)	Firmware	Critical	View Details	HPD5	Environment Dependent
<input type="checkbox"/>	Online Flash Component for Windows x64 - Gen10 NVMe Backplane PIC Firmware (cp037722)	Firmware	Optional	View Details	1.20	No
<input type="checkbox"/>	Online ROM Flash Component for Windows (x64) - MO000400JWUFT, MO000800JWUFU, MO001600JWUFV, MO003200JWUGA, MO006400JWUGB, EO000400JWUGC, EO000800JWUGD and EO001600JWUGE Drives (cp038952)	Firmware	Optional	View Details	HPD1	Environment Dependent
<input type="checkbox"/>	Online ROM Flash Component for Windows x64 - Server Platform Services (SPS) Firmware for HPE Gen10 Servers (cp039727)	Firmware	Optional	View Details	04.01.04.296	Required
<input type="checkbox"/>	Online ROM Flash for Windows x64 - HPE Gen10 Innovation Engine Firmware for HPE Gen10 Servers (cp039812)	Firmware	Recommended	View Details	0.2.1.2	Required

If you do not have any concerns, please click “Select All”.



Deployment summary

▼ localhost - applicable components

iLO Install Set management options

- Save Components as an Install Set on iLO Repository
- Update the existing recovery set with components (BIOS, iLO, IE, ME, CPLD) from this run

Applicable Components: 25

Suggested Components: 19

Selected Components: 25

Select all Deselect all

Search

Please click "Deploy".

The screenshot shows the 'Localhost Guided Update' interface in a web browser. The browser address bar shows a URL with a 'Certificate error' warning. The page title is 'Localhost Guided Update' and the version is 'Smart Update Manager 8.4.5'. The main content area displays a list of updates with columns for selection status, description, type, priority, version, and required status. The updates include Intel Xeon Processor Scalable Family for Windows Server 2012 R2 to Server 2019, HPE QLogic FastLinQ Online Firmware Upgrade Utility for Windows Server x64 Editions, and various Online ROM Flash Components for Windows x64. At the bottom of the update list, there are buttons for 'Back', 'Deploy', and 'Start Over'. Below the update list is a 'Warnings/Alerts' section which is currently empty. The Windows taskbar at the bottom shows the time as 8:11 AM on 9/30/2019.

Selection	Description	Type	Priority	Version	Required
Selected	Identifiers for Intel Xeon Processor Scalable Family for Windows Server 2012 R2 to Server 2019 (cp038754)	Driver	Optional	10.1.17861.0101	No
Selected	HPE QLogic FastLinQ Online Firmware Upgrade Utility for Windows Server x64 Editions (cp035083)	Firmware	Optional	View Details 5.1.4.0	Required
Select	Online ROM Flash Component for Windows (x64) - HPE Smart Array P408i-p, P408e-p, P408i-a, P408i-c, E208i-p, E208e-p, E208i-c, E208i-a, P408i-sb, P408e-m, P204i-c, P204i-b, P816i-a and P416i-e SR Gen10 (cp039215)	Firmware	Recommended	1.98 1.99	Required
Forced	Online ROM Flash Component for Windows x64 - HPE ProLiant DL380 Gen10 (U30) Servers (cp038505)	Firmware	Optional	U30 2.10 - (05/21/2019) U30 2.10 - (05/21/2019)	Required
Forced	Online ROM Flash Component for Windows (x64) - VO000960JWTBK, VO001920JWTFB, VO003840JWTFB, VO007680JWTFB, MO000400JWTFB, MO000800JWTFB, MO001600JWTFB, MO003200JWTFB, MO006400JWTFB, EO000400JWTFB, EO000800JWTFB, EO001600JWTFB, EO003200JWTFB, EO006400JWTFB (cp039369)	Firmware	Critical	View Details HPD5	Environment Dependent
Forced	Online Flash Component for Windows x64 - Gen10 NVMe Backplane PIC Firmware (cp037722)	Firmware	Optional	View Details 1.20	No
Forced	Online ROM Flash Component for Windows (x64) - MO000400JWUFT, MO000800JWUFT, MO001600JWUFT, MO003200JWUGA, MO006400JWUGB, EO000400JWUGC, EO000800JWUGD and EO001600JWUGE Drives (cp038952)	Firmware	Optional	View Details HPD1	Environment Dependent
Forced	Online ROM Flash Component for Windows x64 - Server Platform Services (SPS) Firmware for HPE Gen10 Servers (cp039727)	Firmware	Optional	View Details 04.01.04.296	Required
Forced	Online ROM Flash for Windows x64 - HPE Gen10 Innovation Engine Firmware for HPE Gen10 Servers (cp039812)	Firmware	Recommended	View Details 0.2.1.2	Required

The process is started after that.

The screenshot shows the 'Localhost Guided Update' interface in a web browser, now in the 'Deployment' phase. The browser address bar shows a URL with a 'Certificate error' warning. The page title is 'Localhost Guided Update' and the version is 'Smart Update Manager 8.4.5'. The main content area displays a progress bar with three steps: 'Step 1 Inventory', 'Step 2 Review', and 'Step 3 Deployment'. 'Step 3 Deployment' is currently active. Below the progress bar, there is a 'Deployment' section with a progress indicator for 'localhost' showing 'Deployment in progress' and 'Deployment started'. At the bottom of the deployment section, there are buttons for 'Start Over', 'Abort', and 'Reboot'. The Windows taskbar at the bottom shows the time as 8:11 AM on 9/30/2019.

Localhost Guided Update

Smart Update Manager 8.4.5

Step 1 Inventory | Step 2 Review | **Step 3 Deployment**

Deployment

localhost Deployment in progress Deploying cp040393.exe Online ROM Flash Component for Windows x64 - HPE Integrated Lights-Out 5

Start Over Abort Reboot

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8:11 AM 9/30/2019

Localhost Guided Update

Smart Update Manager 8.4.5

Step 1 Inventory | Step 2 Review | **Step 3 Deployment**

Deployment

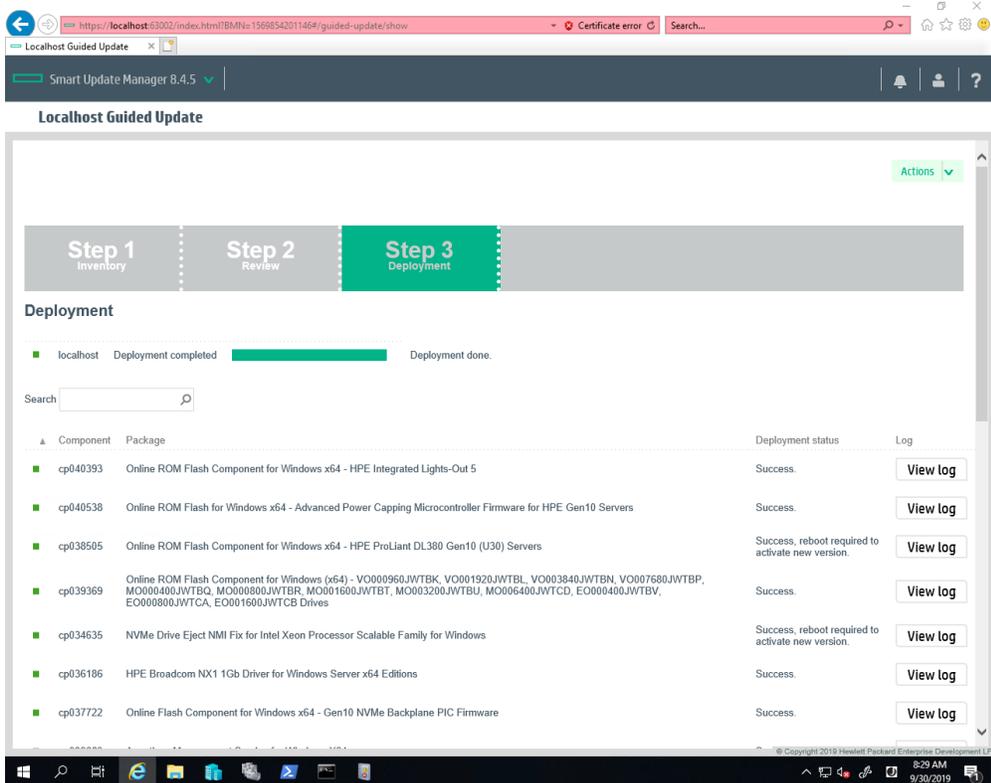
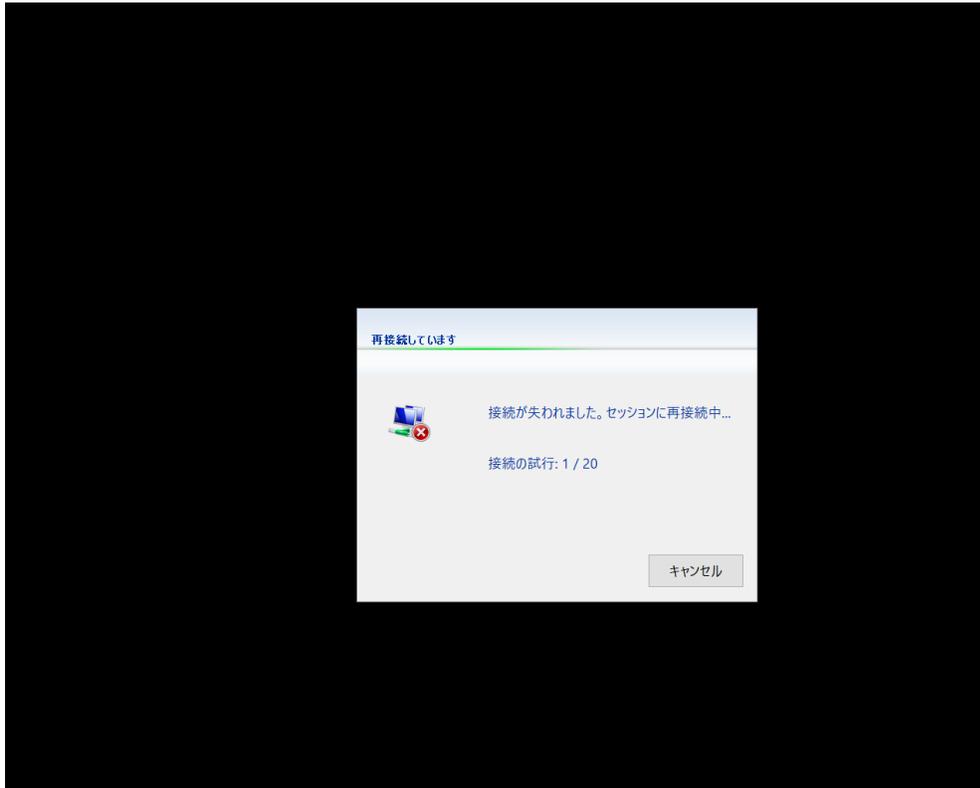
localhost Deployment in progress Deploying cp039369.exe Online ROM Flash Component for Windows (x64) - VO000960JWTK, VO001920JWTL, VO003840JWTK, VO007680JWTK, MO000400JWTK, MO000800JWTK, MO001600JWTK, MO003200JWTK, MO006400JWTK, EO000400JWTK, EO000800JWTK, EO001600JWTK Drives

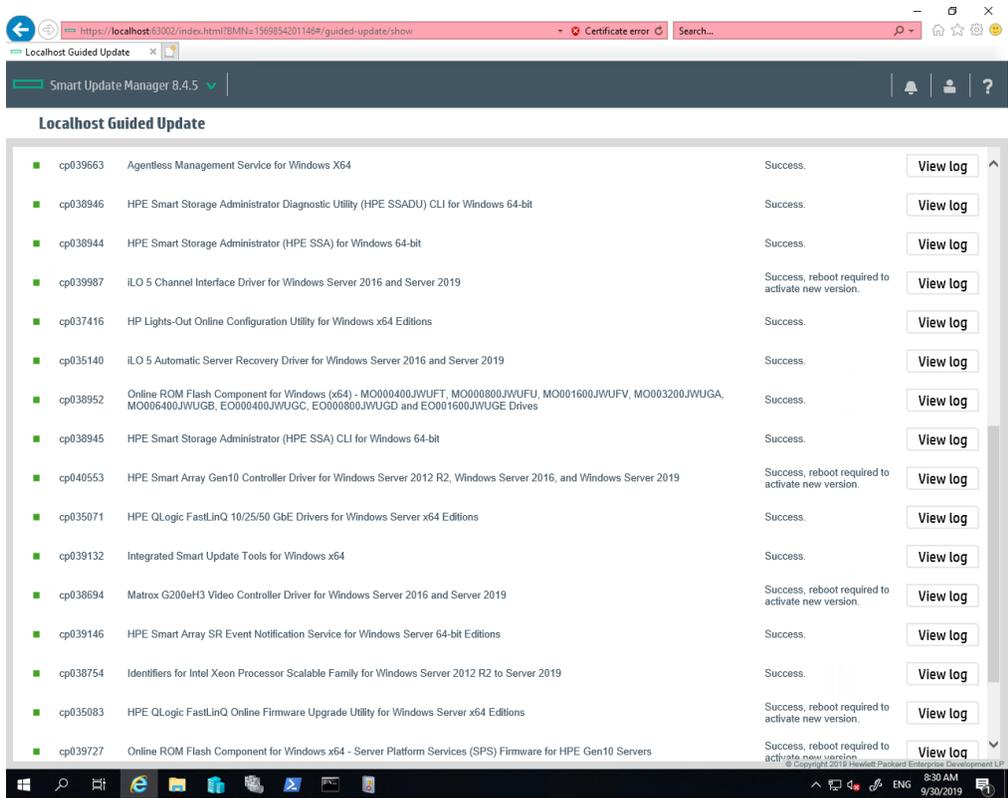
Start Over Abort Reboot

© Copyright 2019 Hewlett Packard Enterprise Development LP

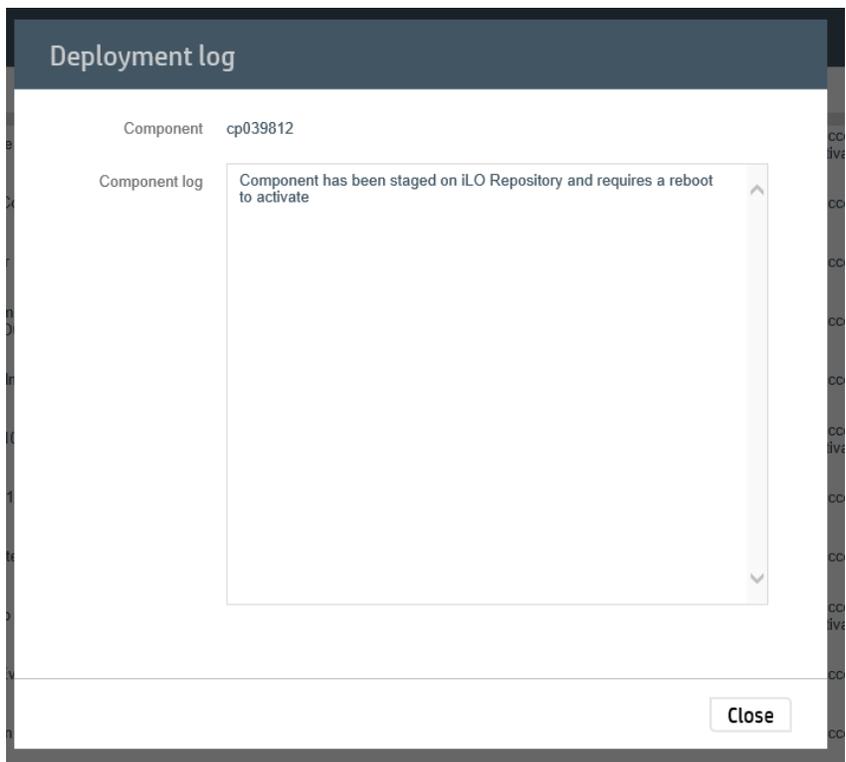
8:19 AM 9/30/2019

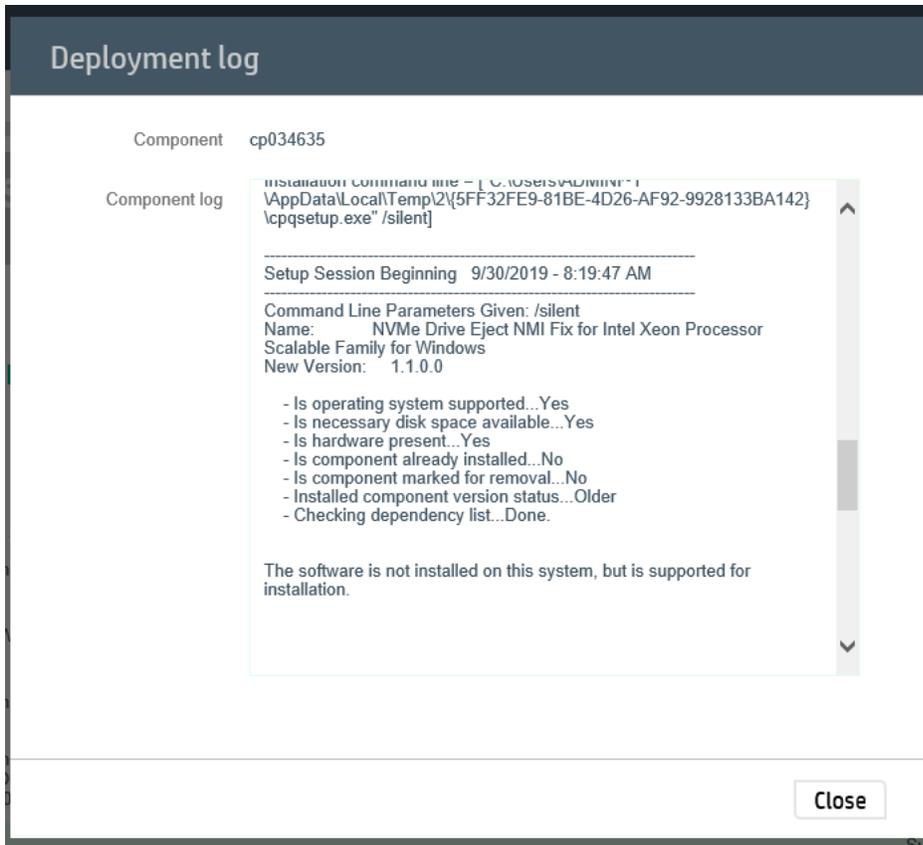
When it updates the NIC driver or firmware, you will lose your network connection.



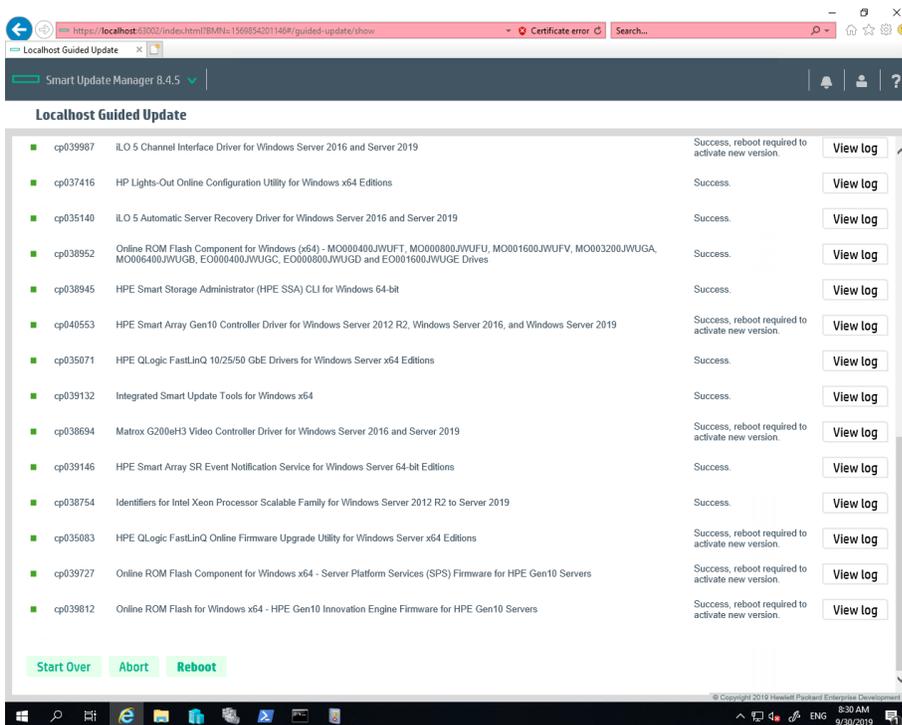


If you click “View log”, you can see the detail.

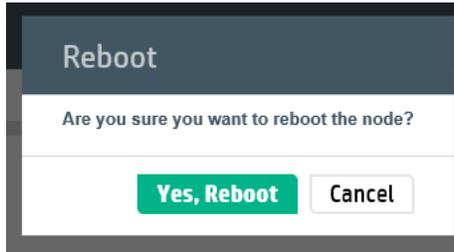




Please click "Reboot".

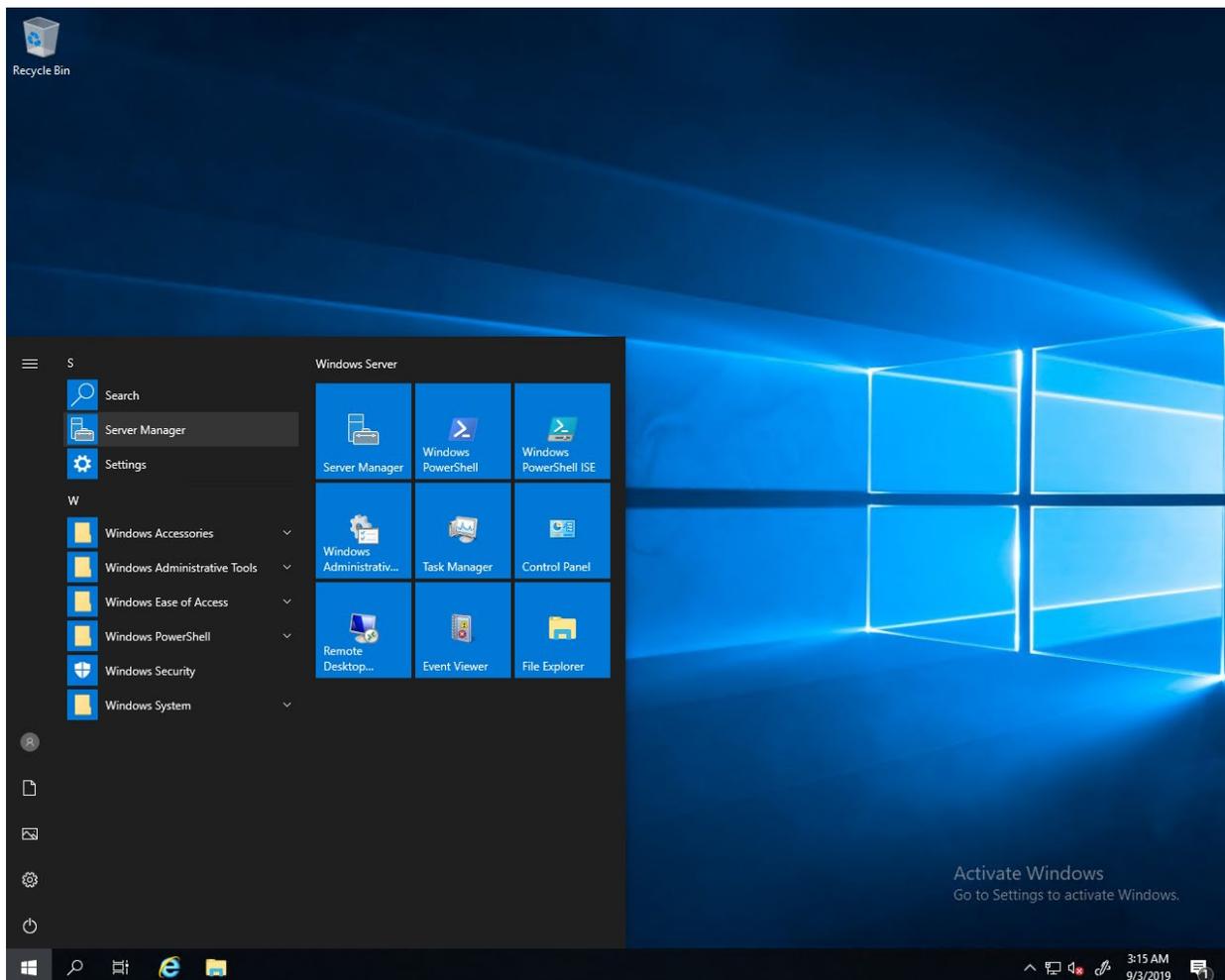


Please click “Yes”.



Join Company AD Domain

Please open Server Manager.



Please click "Local Server".

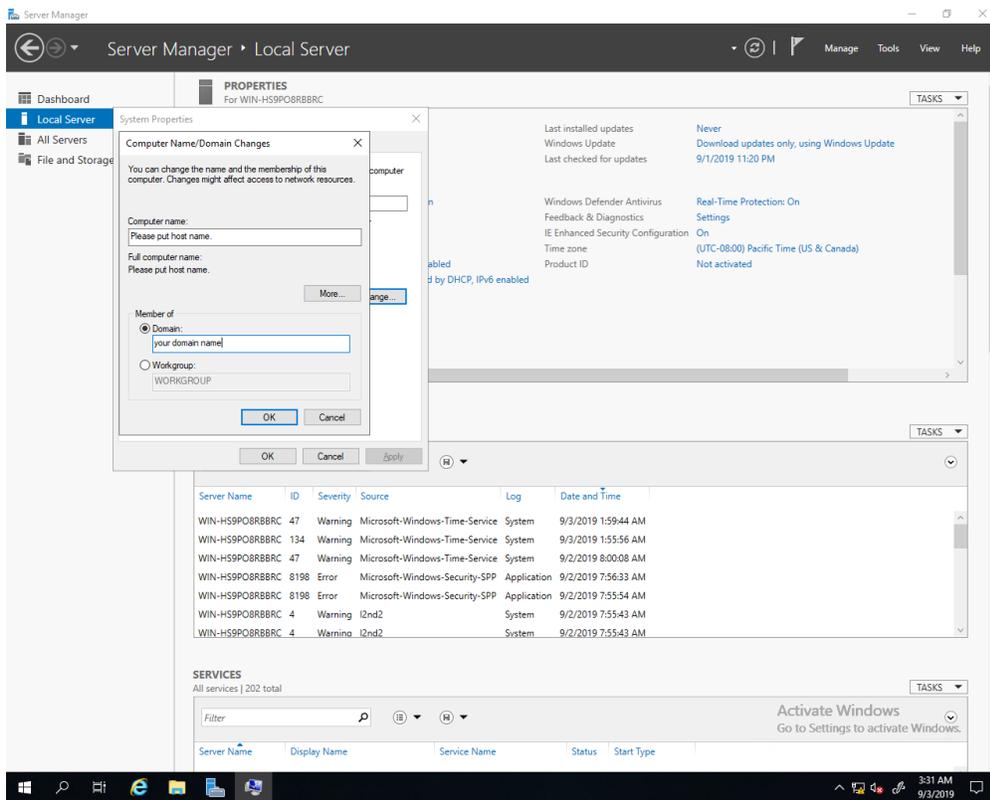
The screenshot shows the Windows Server Manager interface for a local server named WIN-H59PO8RBBRC. The left-hand navigation pane has "Local Server" selected. The main area displays the "PROPERTIES" section for this server, including details like computer name, workgroup, and various system settings such as Windows Defender Firewall, Remote Desktop, and Windows Defender Antivirus. Below the properties is an "EVENTS" section showing a list of system events with columns for Server Name, ID, Severity, Source, Log, and Date and Time. At the bottom, there is a "SERVICES" section with a table of installed services.

Server Name	ID	Severity	Source	Log	Date and Time
WIN-H59PO8RBBRC	47	Warning	Microsoft-Windows-Time-Service	System	9/3/2019 1:59:44 AM
WIN-H59PO8RBBRC	134	Warning	Microsoft-Windows-Time-Service	System	9/3/2019 1:55:56 AM
WIN-H59PO8RBBRC	47	Warning	Microsoft-Windows-Time-Service	System	9/2/2019 8:00:08 AM
WIN-H59PO8RBBRC	8198	Error	Microsoft-Windows-Security-SPP	Application	9/2/2019 7:56:33 AM
WIN-H59PO8RBBRC	8198	Error	Microsoft-Windows-Security-SPP	Application	9/2/2019 7:55:54 AM
WIN-H59PO8RBBRC	4	Warning	l2nd2	System	9/2/2019 7:55:43 AM
WIN-H59PO8RBBRC	4	Warning	l2nd2	System	9/2/2019 7:55:43 AM

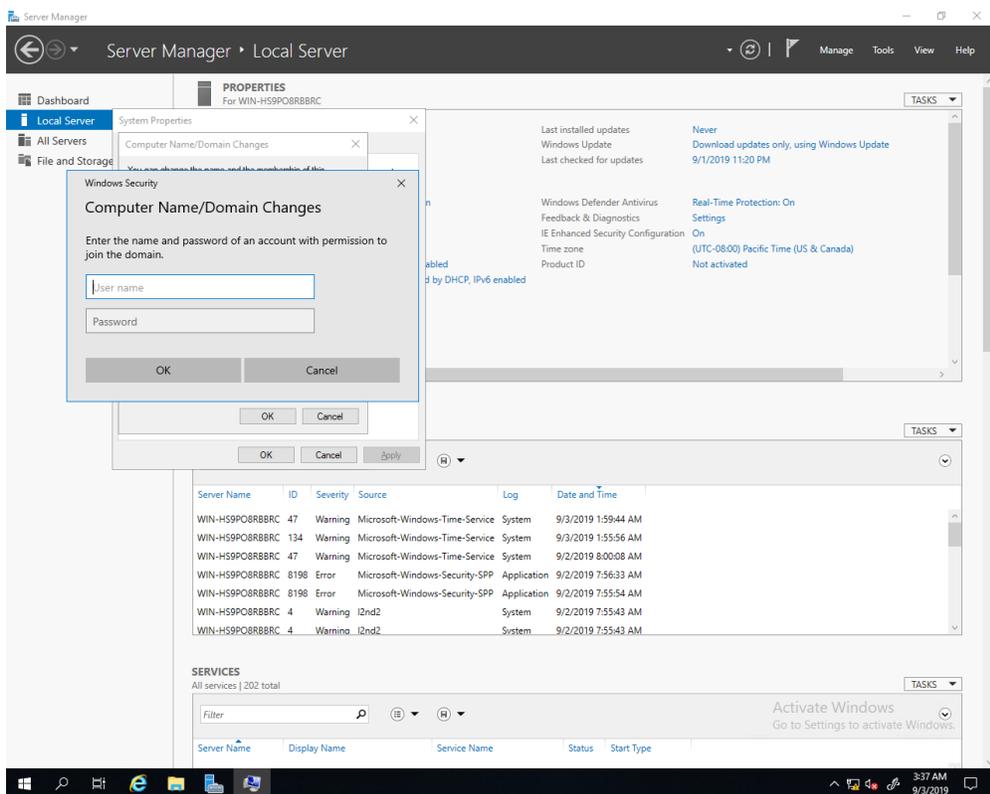
Please click "Change".

This screenshot shows the Windows Server Manager interface for a local server named WIN-KQGSUIMORTF. The "System Properties" dialog box is open, displaying the "Computer Name" tab. The dialog shows the current computer name as WIN-KQGSUIMORTF and the workgroup as WORKGROUP. A "Change..." button is visible, which is the target of the instruction. The background shows the same "PROPERTIES" and "EVENTS" sections as the previous screenshot, but they are partially obscured by the dialog box.

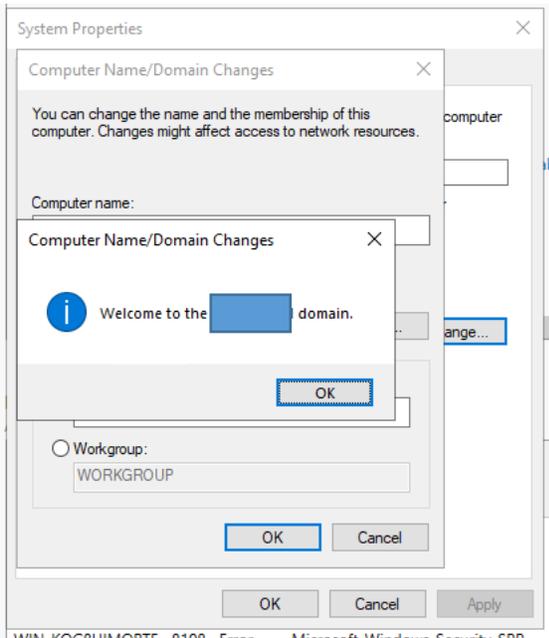
Please input your host name and domain name.



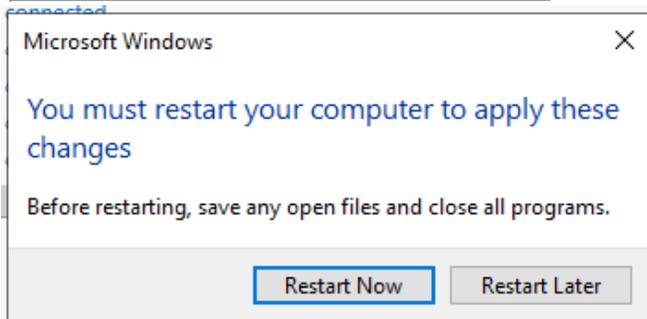
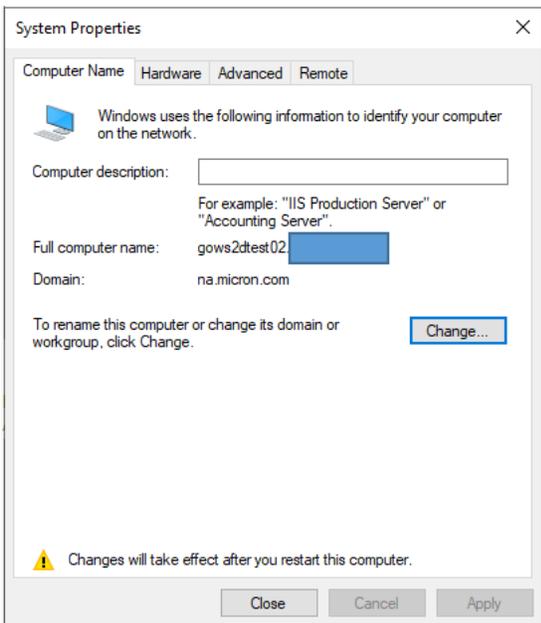
Please put your credentials.



You will be able to join the domain as below.

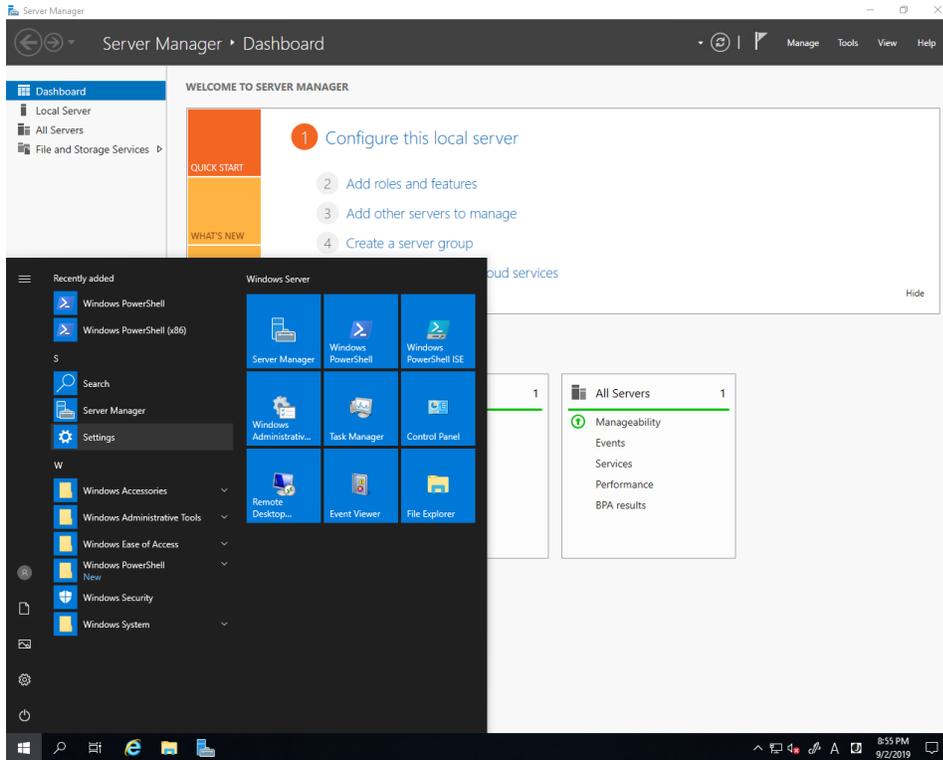


The server will be rebooted.

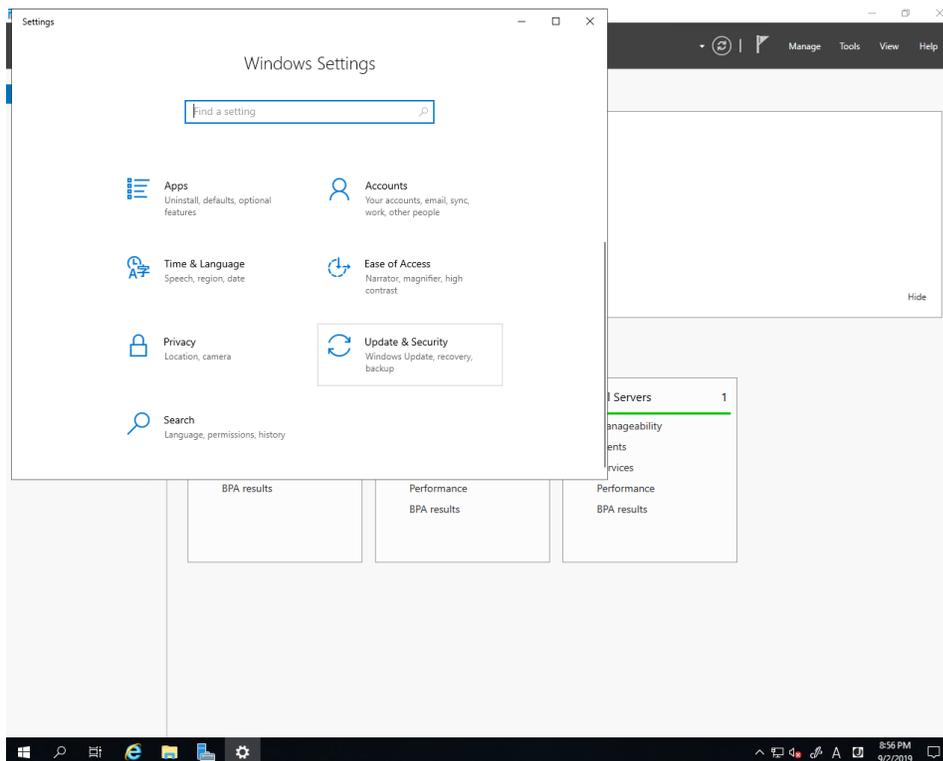


Install All of the MS-Patches

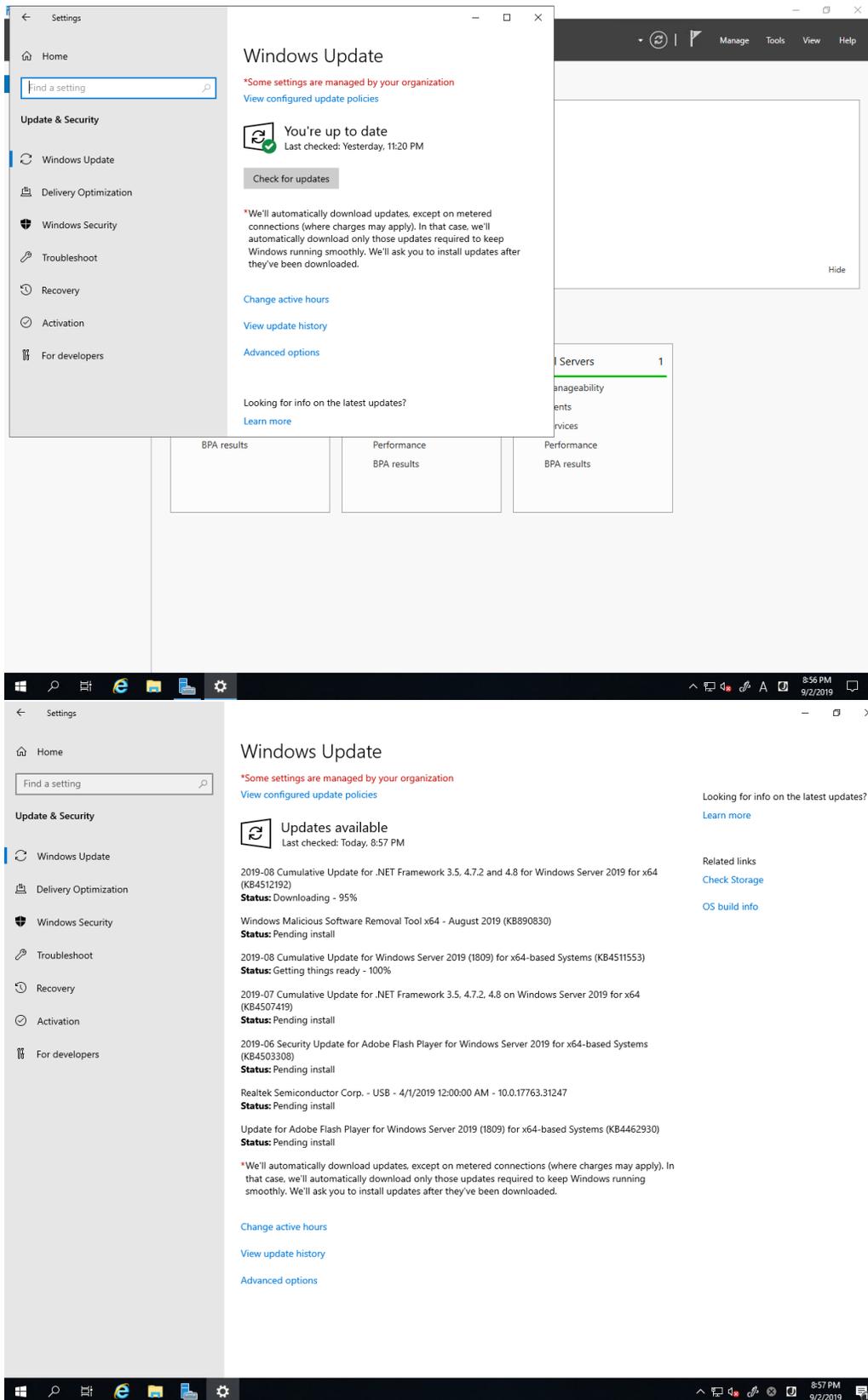
Please move to “Settings”.



Please click “Updates & Security”.



Please install all the patches from Microsoft.



The screenshot shows the Windows Update settings page. On the left is a navigation pane with 'Update & Security' selected. The main content area is titled 'Windows Update' and features a notification: 'Restart required' with a red exclamation mark icon, stating 'Your device will restart outside of active hours.' Below this, three updates are listed, all with a status of 'Pending restart':

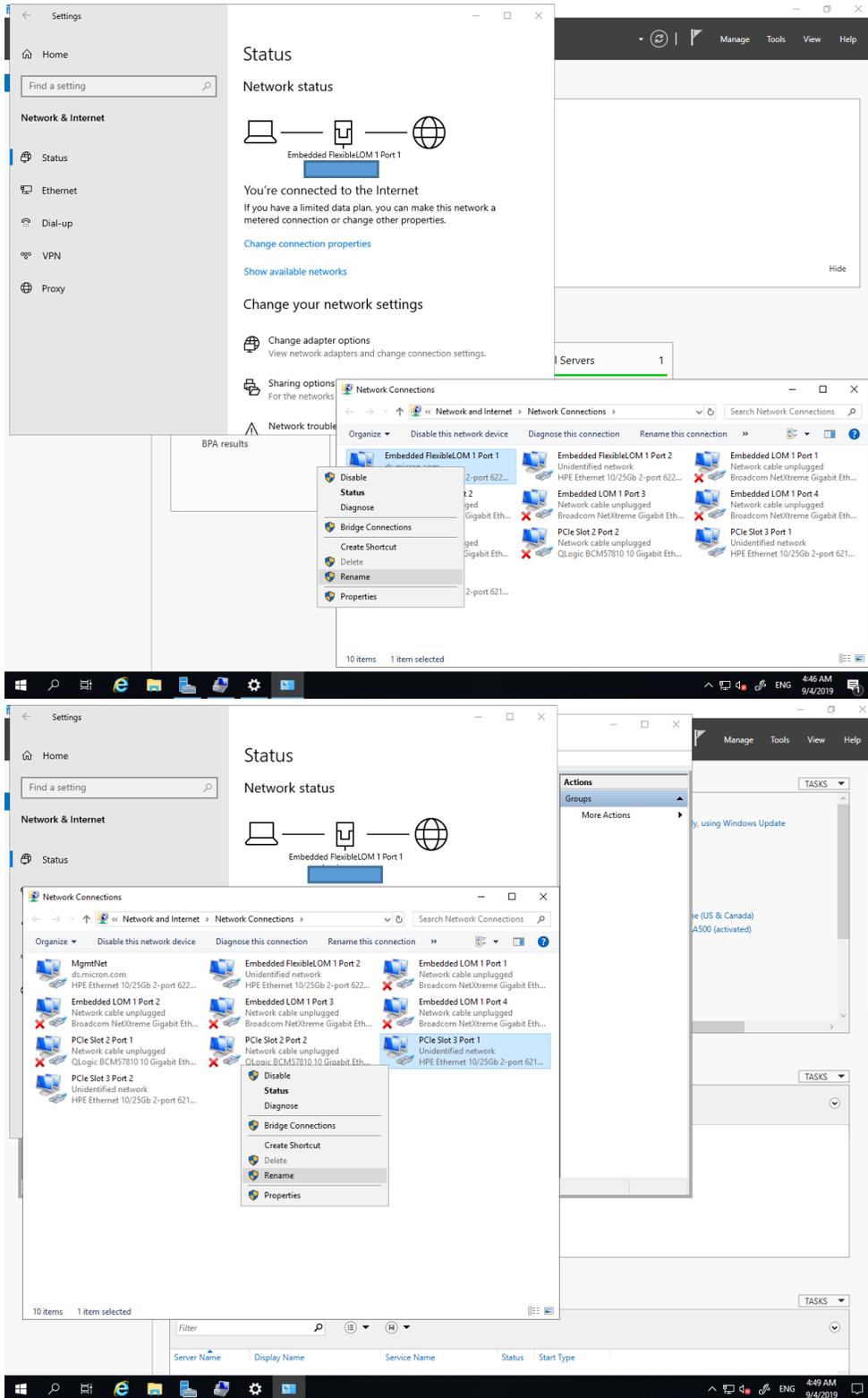
- 2019-08 Cumulative Update for .NET Framework 3.5, 4.7.2 and 4.8 for Windows Server 2019 for x64 (KB4512192)
- 2019-08 Cumulative Update for Windows Server 2019 (1809) for x64-based Systems (KB4511553)
- 2019-07 Cumulative Update for .NET Framework 3.5, 4.7.2, 4.8 on Windows Server 2019 for x64 (KB4507419)

Buttons for 'Restart now' and 'Schedule the restart' are visible. A note at the bottom explains automatic download behavior on metered connections. The taskbar at the bottom shows the time as 9:22 PM on 9/2/2019.

Please confirm that you do not have any other patching.

Configure Network Adaptor

Please rename current NIC's adaptor to "MgmtNet".



Please check the network cable diagram, then rename the Network adaptor for your storage network as StorageNet1 and StorageNet2 on each node.

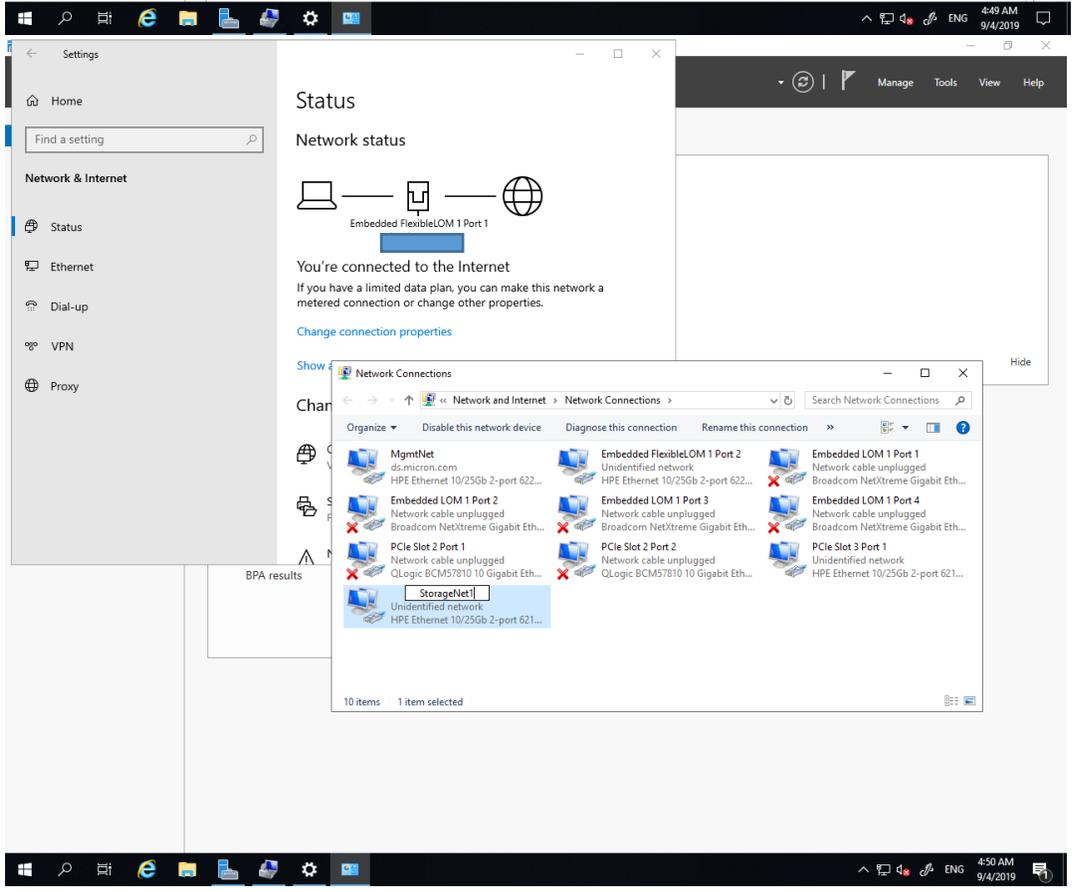
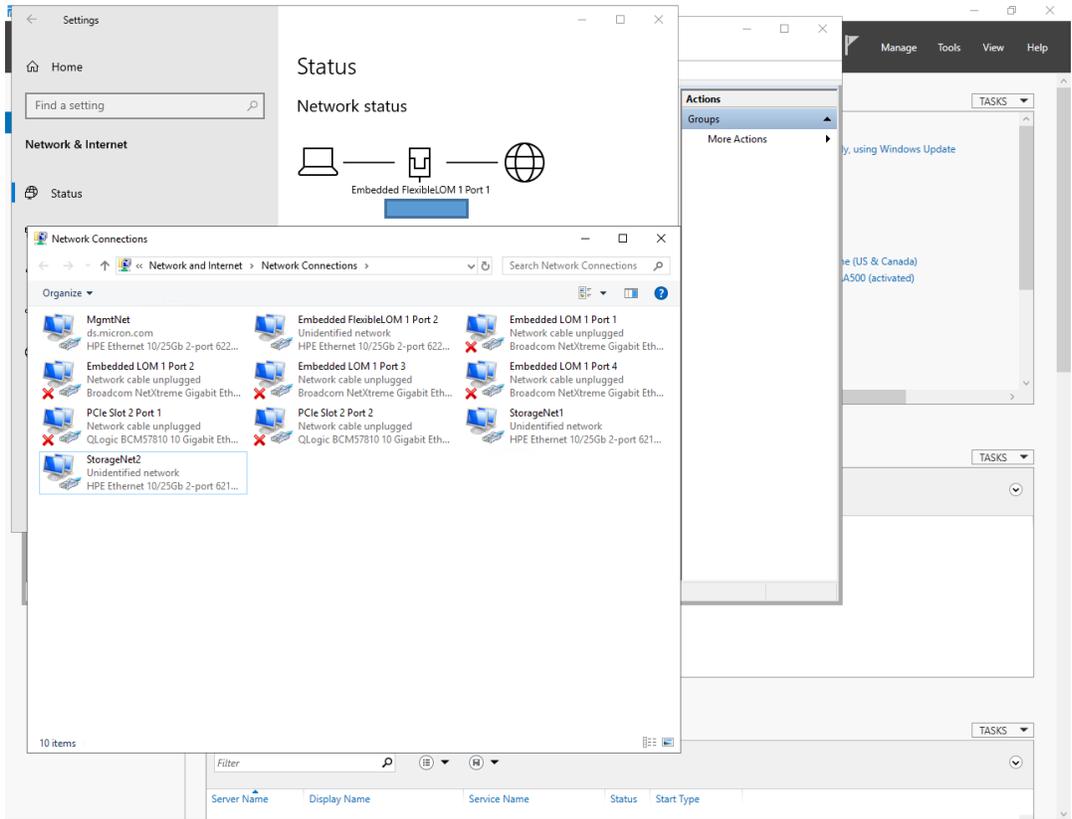
StorageNet1 [PCI Slot 2 Port 1 on Node 1 <==> PCI Slot 2 Port 2 on Node 2]

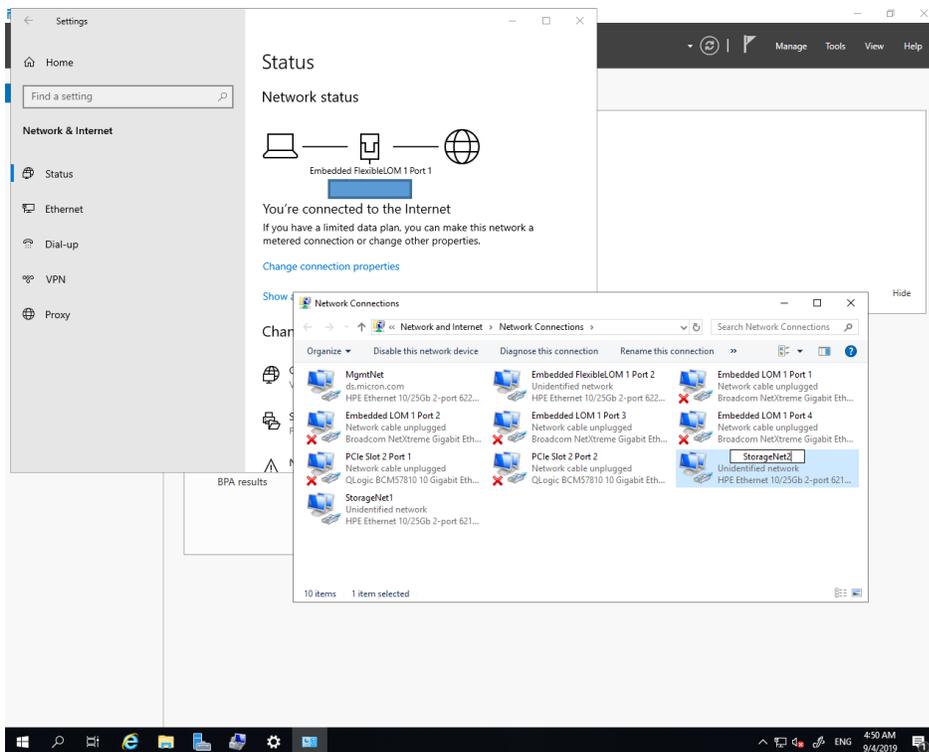
StorageNet2 [PCI Slot 2 Port 2 on Node 1 <==> PCI Slot 2 Port 1 on Node 2]

StorageNet3 [PCI Slot 3 Port 1 on Node 1 <==> PCI Slot 3 Port 2 on Node 2]

StorageNet4 [PCI Slot 3 Port 2 on Node 1 <==> PCI Slot 3 Port 1 on Node 2]

StorageNet1 (PCI slot 2 Port 1 on gows2dtest01)	StorageNet1 ((PCI slot 2 Port 2 on gows2dtest02)
192.168.10.111/24	192.168.10.112/24
StorageNet2 (PCI slot 2 Port 2 on gows2dtest01)	StorageNet2 ((PCI slot 2 Port 1 on gows2dtest02)
192.168.20.121/24	192.168.20.122/24
StorageNet3 (PCI slot 3 Port 1 on gows2dtest01)	StorageNet3 ((PCI slot 3 Port 2 on gows2dtest02)
192.168.30.131/24	192.168.30.132/24
StorageNet4 (PCI slot 3 Port 2 on gows2dtest01)	StorageNet4 ((PCI slot 3 Port 1 on gows2dtest02)
192.168.40.141/24	192.168.40.142/24



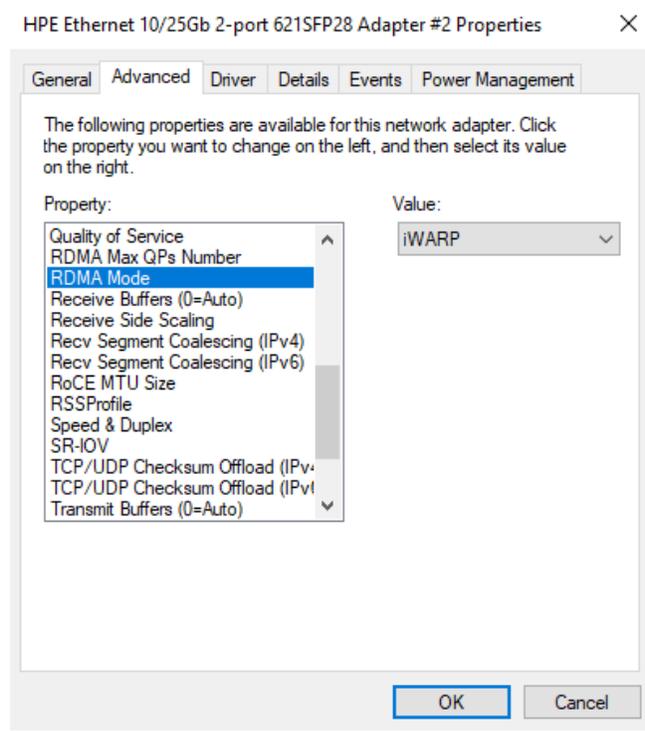
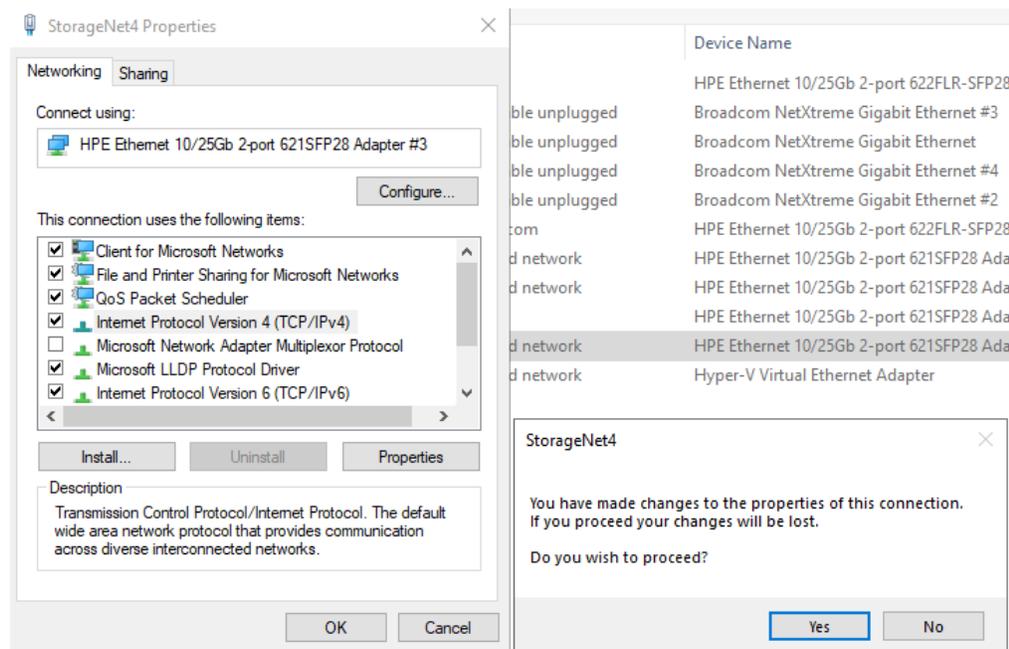


Please test the network connection after setting up a closed network (Storage Network for RDMA).

Name	Status	Device Name
Embedded FlexibleLOM 1 Port 1	ds.micron.com	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 Converged Network Adapter #1
Embedded FlexibleLOM 1 Port 2	Unidentified network	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 Converged Network Adapter #2
Embedded LOM 1 Port 1	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #1
Embedded LOM 1 Port 2	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #2
Embedded LOM 1 Port 3	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #3
Embedded LOM 1 Port 4	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #4
StorageNet1PCIe Slot 3 Port 1	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #3
StorageNet2PCIe Slot 3 Port 2	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #4
StorageNet3PCIe Slot 2 Port 1	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #2
StorageNet4PCIe Slot 2 Port 2	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #1

Name	Status	Device Name
Embedded FlexibleLOM 1 Port 1	ds.micron.com	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 Converged Network Adapter #1
Embedded FlexibleLOM 1 Port 2	Unidentified network	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 Converged Network Adapter #2
Embedded LOM 1 Port 1	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #4
Embedded LOM 1 Port 2	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #3
Embedded LOM 1 Port 3	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #1
Embedded LOM 1 Port 4	Network cable unplugged	Broadcom NetXtreme Gigabit Ethernet #2
StorageNet1PCIe Slot 3 Port 2	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #4
StorageNet2PCIe Slot 3 Port 1	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #3
StorageNet3PCIe Slot 2 Port 2	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #1
StorageNet4PCIe Slot 2 Port 1	Unidentified network	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter #2

Please select RDMA as below on each Network adaptor for the storage network. Please open property, click Configure..., Move to the Advanced tab and change the setting to iWARP in RDMA mode. The setting is at the port level. Please configure all the ports for the storage network.



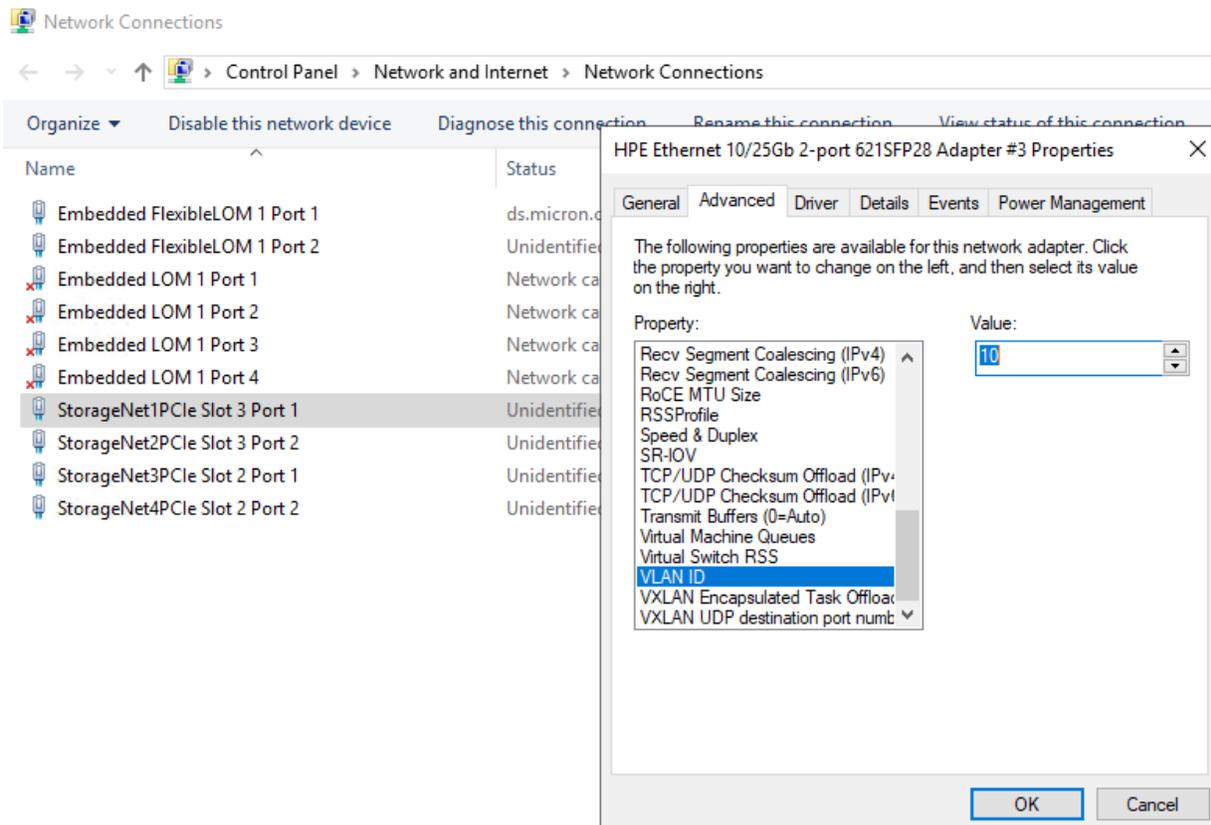
Please configure VLAN ID also. If you use a switched network, the VLAN ID will be provided by your Network team.

VLAN 10 for Storage Net1

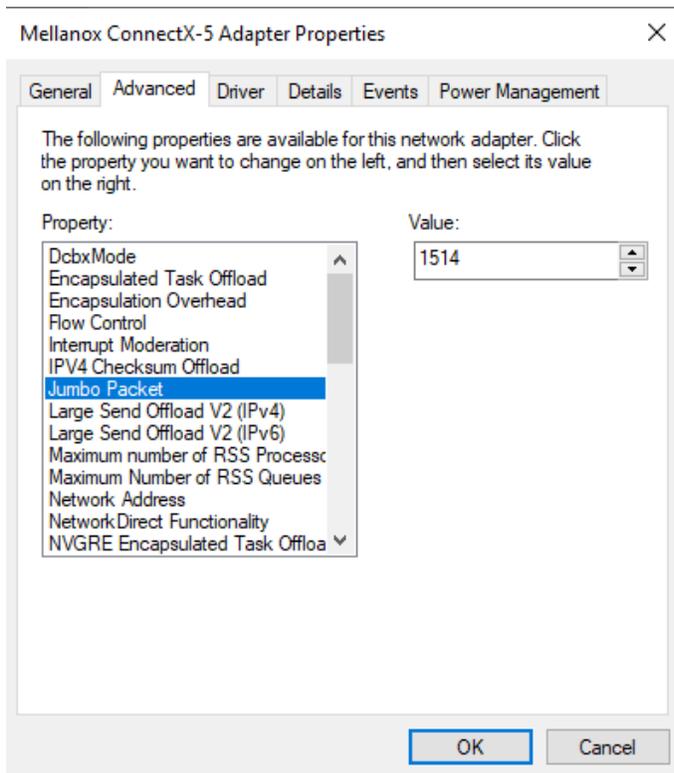
VLAN 20 for Storage Net2

VLAN 30 for Storage Net3

VLAN 40 for Storage Net4



Please change the Jumbo Packet to MTU9000. You can put 9000 or 9216 in the below field, but the network switch should have MTU9216. If the value is lower than server side, the packet will be dropped. If you need to select other values in a field, like below, choose number great than 9000. 9014 is a good example, below.



When you change them, you will see some packet loss (you will have 3 or 4 ping losses).

Please enable SR-IOV with the command below for each node.

```
PS> Enable-NetAdapterSriov NIC1
```

```
PS> Enable-NetAdapterSriov NIC2
```

Note: You can confirm the status with Get-NetAdapterSriov in Windows PowerShell.

Enable RDMA

You can confirm current status with the below command.

- Get-NetAdapterRdma

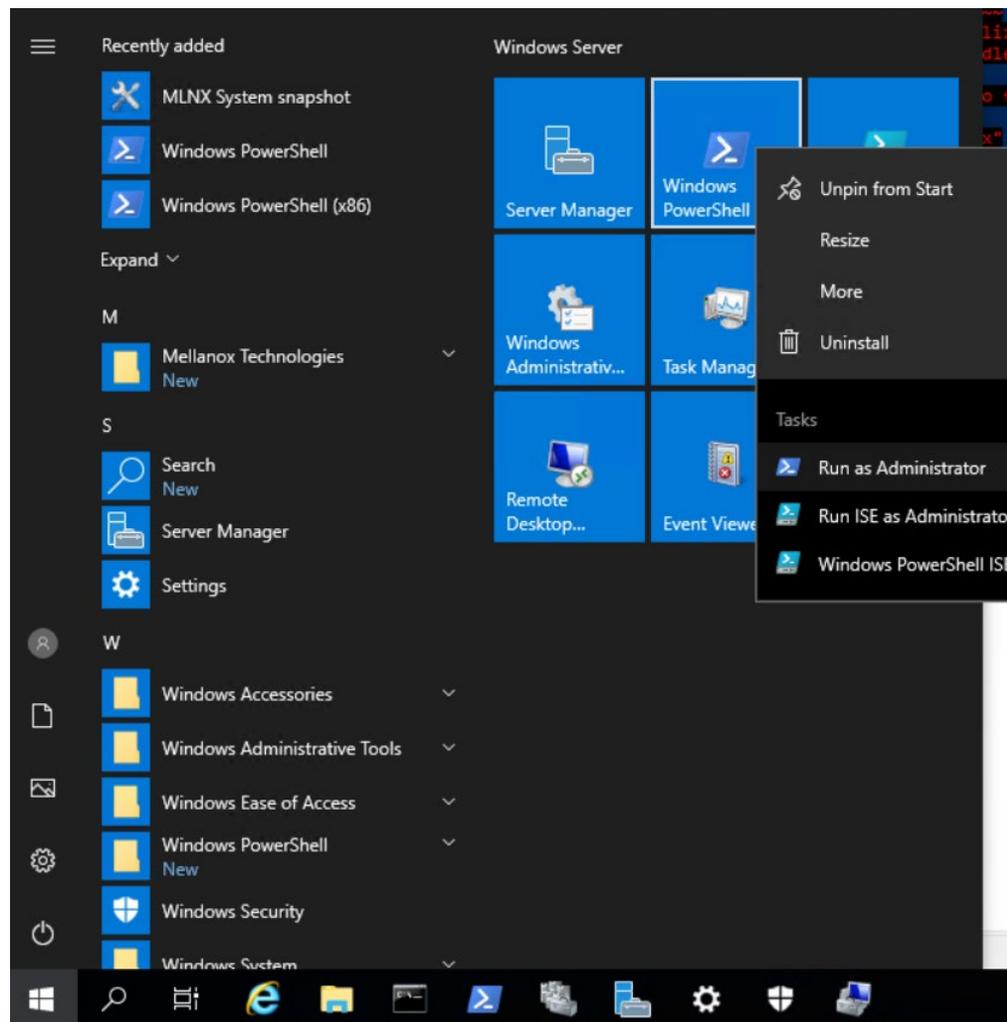
```
PS C:\Windows\system32> Get-NetAdapterRdma

Name                InterfaceDescription           Enabled    PFC    ETS
----                -
StorageNet3         HPE Ethernet 10/25Gb 2-port 621SFP28 ... False    False False
MgmtNet              HPE Ethernet 10/25Gb 2-port 622FLR-SF... False    False False
StorageNet2         HPE Ethernet 10/25Gb 2-port 621SFP28 ... False    False False
Embedded FlexibleLOM 1... HPE Ethernet 10/25Gb 2-port 622FLR-SF... False    False False
StorageNet4         HPE Ethernet 10/25Gb 2-port 621SFP28 ... False    False False
PCIe Slot 2 Port 1  HPE Ethernet 10/25Gb 2-port 621SFP28 ... False    False False

PS C:\Windows\system32>
```

Note: You can see “False” in “Enabled” field.

Please run below PowerShell command.



- Enable-NetAdapterRdma -Name StorageNet*

➤ Sample :

- ✧ Enable-NetAdapterRdma -Name StorageNet1
- ✧ Enable-NetAdapterRdma -Name StorageNet2
- ✧ Enable-NetAdapterRdma -Name StorageNet3
- ✧ Enable-NetAdapterRdma -Name StorageNet4

Please confirm below command after that.

- Get-NetAdapterRdma

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> Enable-NetAdapterRdma -Name StorageNet1
PS C:\Users\Administrator> Enable-NetAdapterRdma -Name StorageNet2
PS C:\Users\Administrator> Enable-NetAdapterRdma -Name StorageNet3
PS C:\Users\Administrator> Enable-NetAdapterRdma -Name StorageNet4
PS C:\Users\Administrator> Get-NetAdapterRdma
```

Name	InterfaceDescription	Enabled	PFC	ETS
StorageNet1	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	True
StorageNet2	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	True
MgmtNetEmbedded Flexib...	HPE Ethernet 10/25Gb 2-port 622FLR-SF...	False	False	False
StorageNet4	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	True
StorageNet3	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	True
vEthernet (HPE Etherne...	Hyper-V Virtual Ethernet Adapter	False	NA	NA
Embedded FlexibleLOM 1...	HPE Ethernet 10/25Gb 2-port 622FLR-SF...	False	False	False
vEthernet (Internal)	Hyper-V Virtual Ethernet Adapter #2	False	NA	NA

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

Result: You can see “True” in “Enabled” field.

If you enable the wrong network adaptor, please disable with this process:

```
PS C:\Windows\system32> Get-NetAdapterRdma
```

Name	InterfaceDescription	Enabled	PFC	ETS
Embedded FlexibleLOM 1...	HPE Ethernet 10/25Gb 2-port 622FLR-SF...	True	False	False
StorageNet2PCIeSlot3Port2	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
StorageNet3PCIeSlot2Port2	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
StorageNet1PCIeSlot3Port1	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
PCIe Slot 2 Port 1	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
Embedded FlexibleLOM 1...	HPE Ethernet 10/25Gb 2-port 622FLR-SF...	True	False	False

```
PS C:\Windows\system32> disable-NetAdapterRdma -Name "PCIe Slot 2 Port 1"
PS C:\Windows\system32> Get-NetAdapterRdma
```

Name	InterfaceDescription	Enabled	PFC	ETS
Embedded FlexibleLOM 1...	HPE Ethernet 10/25Gb 2-port 622FLR-SF...	True	False	False
StorageNet2PCIeSlot3Port2	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
StorageNet3PCIeSlot2Port2	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
StorageNet1PCIeSlot3Port1	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	True	False	False
PCIe Slot 2 Port 1	HPE Ethernet 10/25Gb 2-port 621SFP28 ...	False	False	False
Embedded FlexibleLOM 1...	HPE Ethernet 10/25Gb 2-port 622FLR-SF...	True	False	False

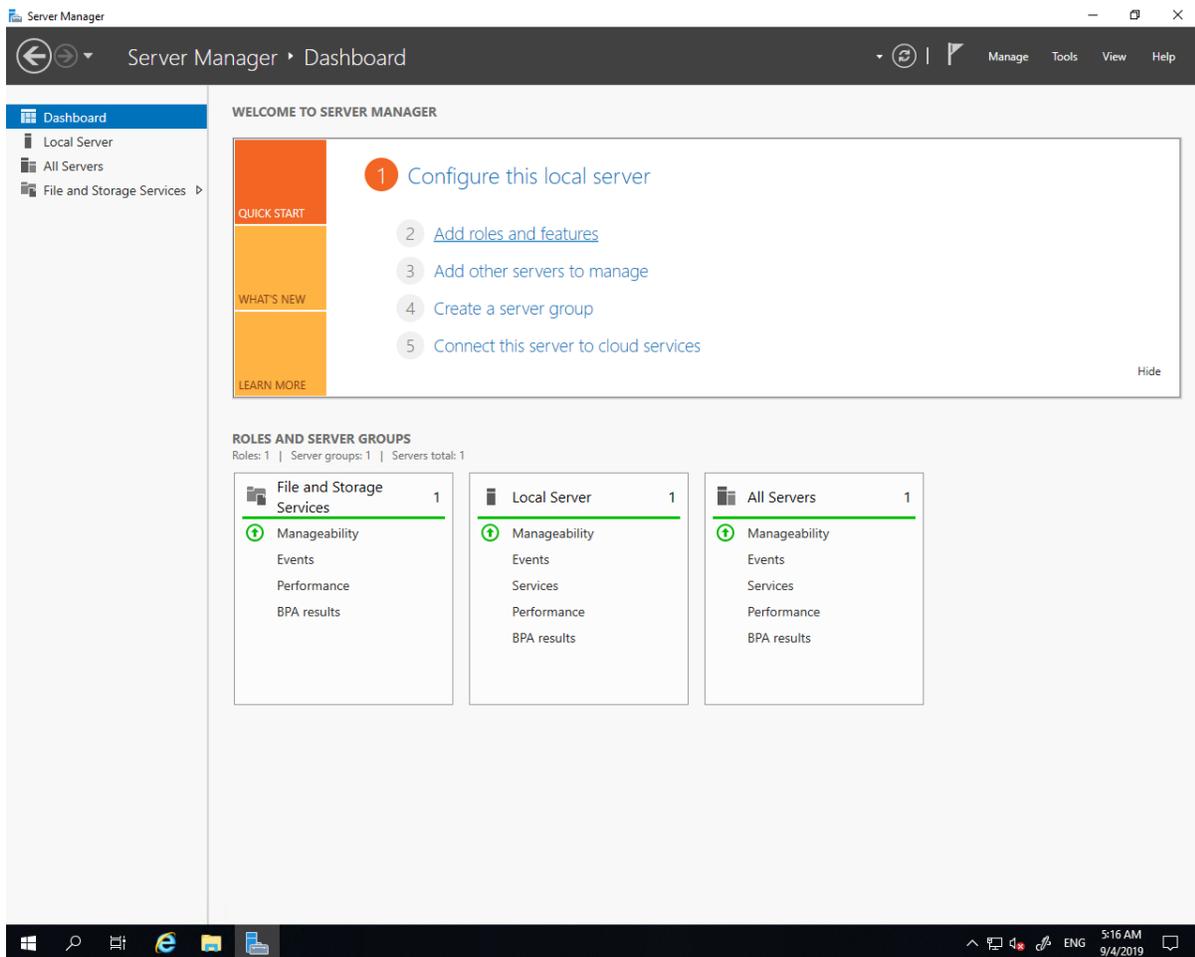
```
PS C:\Windows\system32>
```

disable-NetAdapterRdma -Name "PCIe Slot 2 Port 1"

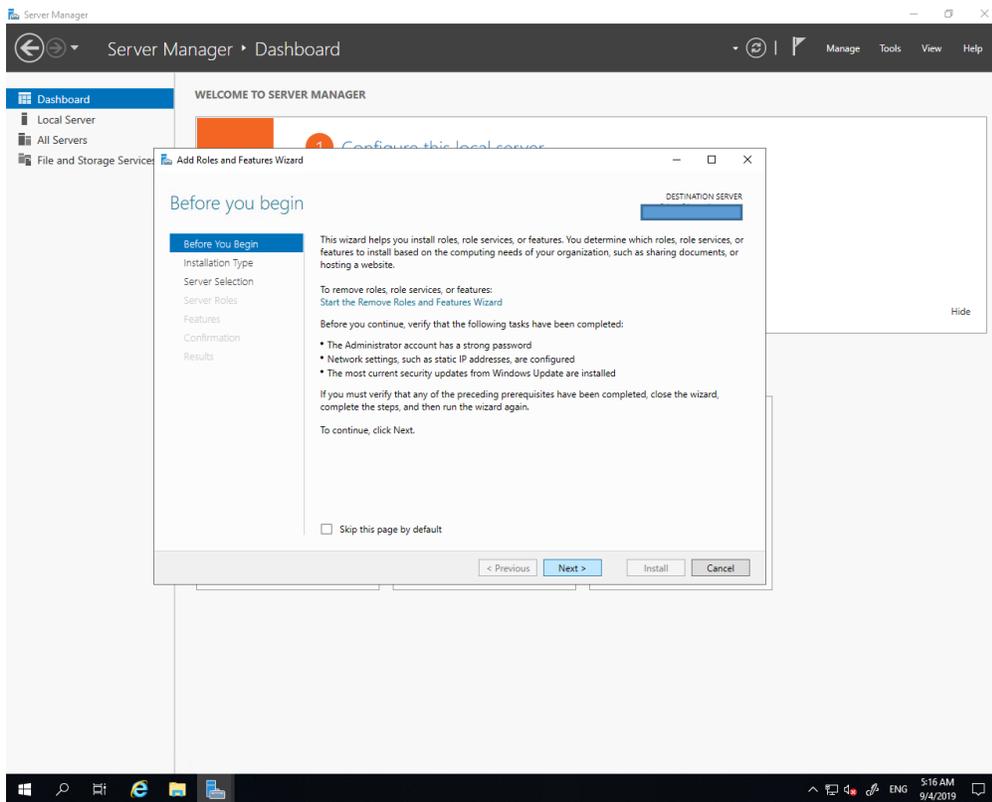
disable-NetAdapterRdma -Name "Embedded FlexibleLOM 1 Port 1"
disable-NetAdapterRdma -Name "Embedded FlexibleLOM 1 Port 2"
disable-NetAdapterRdma -Name "PCIe Slot 2 Port 2"
disable-NetAdapterRdma -Name "Embedded FlexibleLOM 1 Port 1"
disable-NetAdapterRdma -Name "Embedded FlexibleLOM 1 Port 2"

Install Features

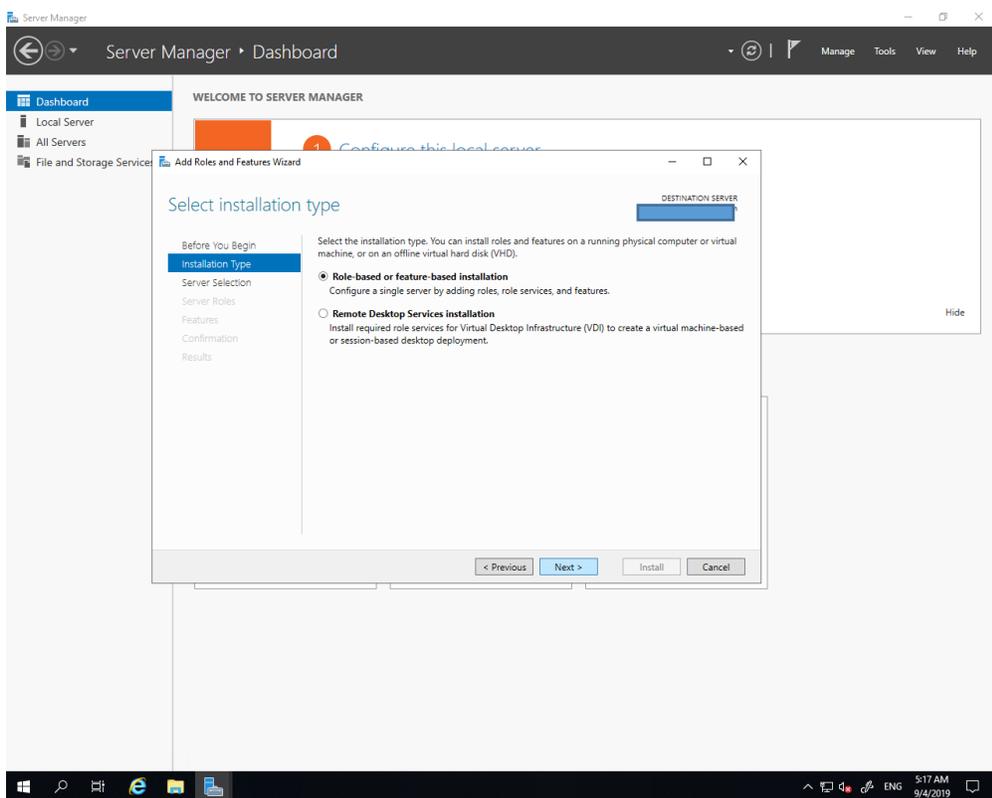
Please open Server Manager from the Start menu, then click “Add roles and features”.



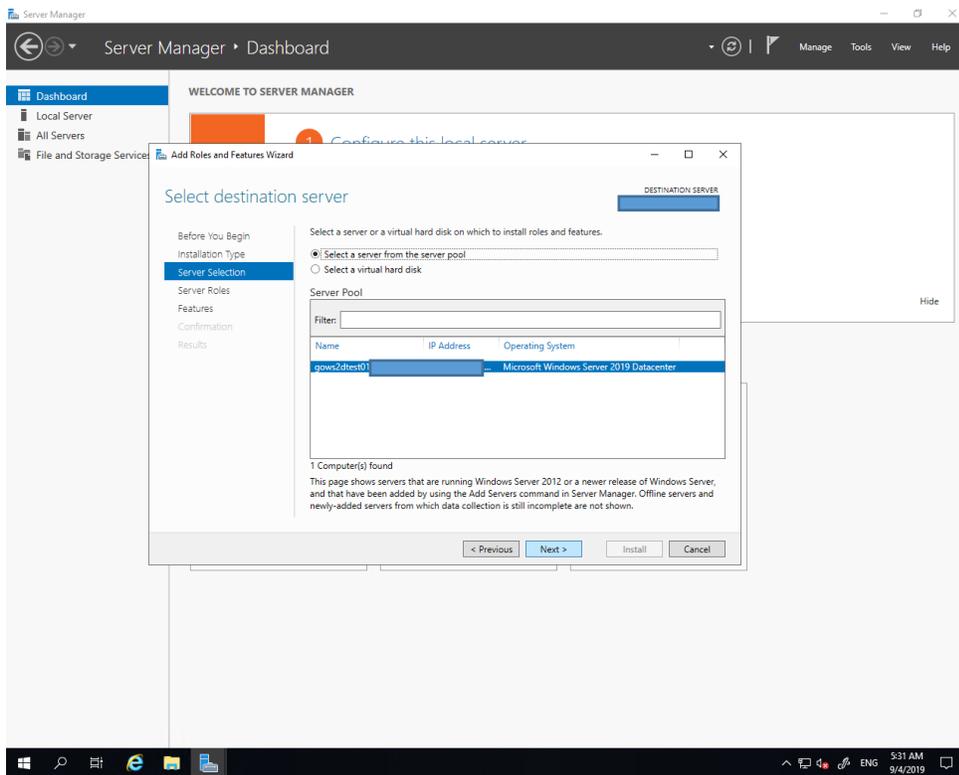
Please click “Next”.



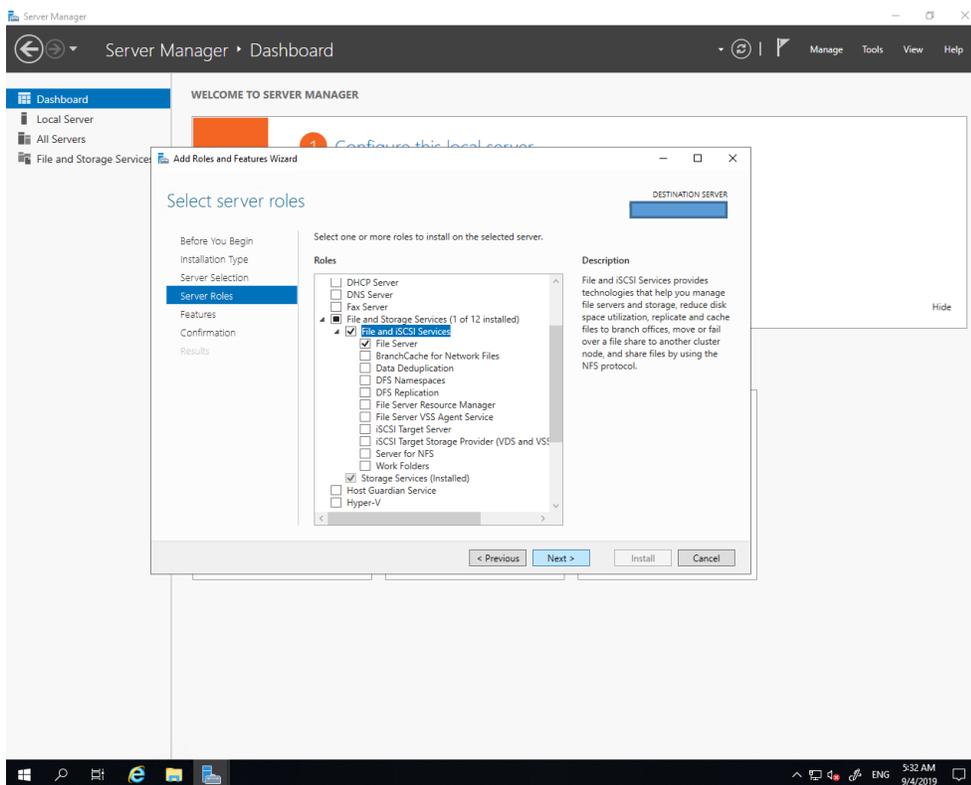
Please select “Role-based or …”.



Please click "Next".



Please select File and Storage Services and select File and iSCSI Services. Please click "Next".



Please click Next.

DESTINATION SERVER
GOWS2DTEST04

Select one or more features to install on the selected server.

Features	Description
<input type="checkbox"/> .NET Framework 3.5 Features	.NET Framework 3.5 combines the power of the .NET Framework 2.0 APIs with new technologies for building applications that offer appealing user interfaces, protect your customers' personal identity information, enable seamless and secure communication, and provide the ability to model a range of business processes.
<input checked="" type="checkbox"/> .NET Framework 4.7 Features (2 of 7 installed)	
<input type="checkbox"/> Background Intelligent Transfer Service (BITS)	
<input type="checkbox"/> BitLocker Drive Encryption	
<input type="checkbox"/> BitLocker Network Unlock	
<input type="checkbox"/> BranchCache	
<input type="checkbox"/> Client for NFS	
<input type="checkbox"/> Containers	
<input type="checkbox"/> Data Center Bridging	
<input type="checkbox"/> Direct Play	
<input type="checkbox"/> Enhanced Storage	
<input type="checkbox"/> Failover Clustering	
<input type="checkbox"/> Group Policy Management	
<input type="checkbox"/> Host Guardian Hyper-V Support	
<input type="checkbox"/> I/O Quality of Service	
<input type="checkbox"/> IIS Hostable Web Core	
<input type="checkbox"/> Internet Printing Client	
<input type="checkbox"/> IP Address Management (IPAM) Server	
<input type="checkbox"/> iSNS Server service	

< Previous Next > Install Cancel

Please click "Install".

DESTINATION SERVER
GOWS2DTEST03

To install the following roles, role services, or features on selected server, click Install.

Restart the destination server automatically if required

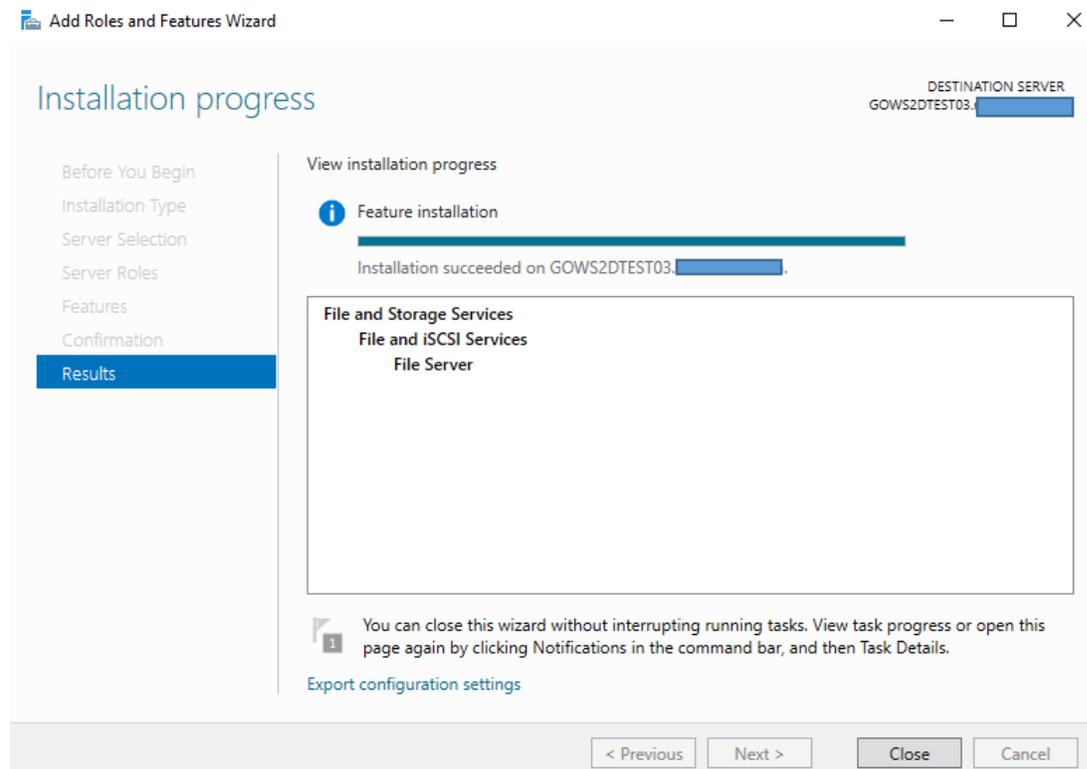
Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.

File and Storage Services
File and iSCSI Services
File Server

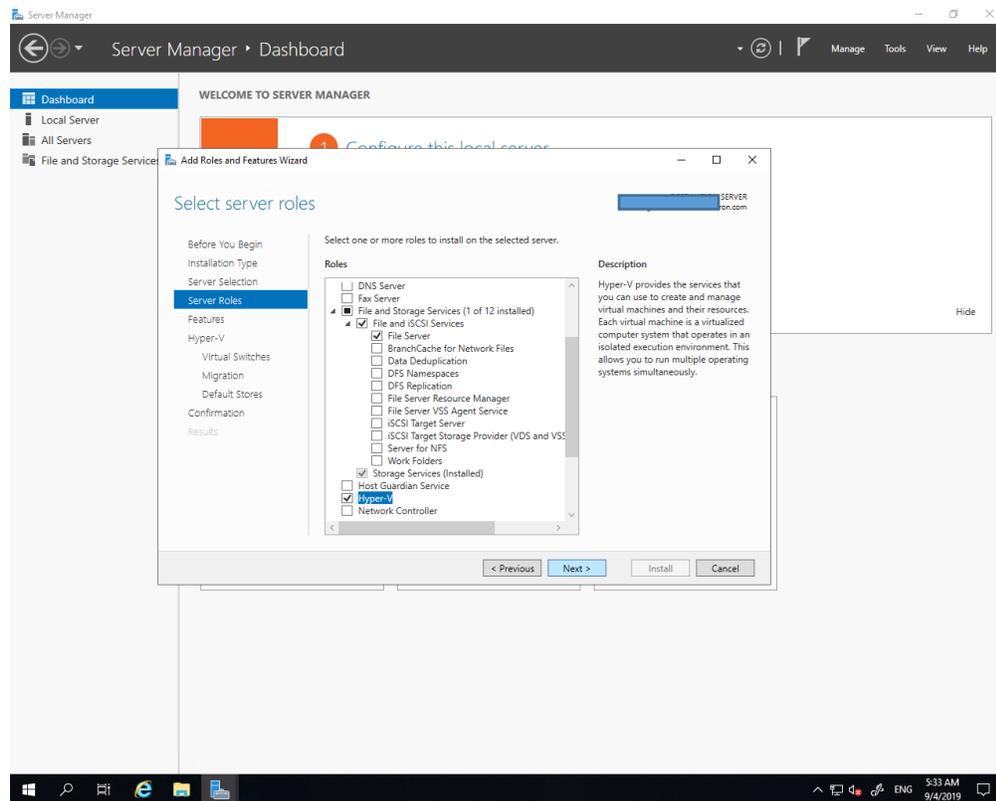
Export configuration settings
Specify an alternate source path

< Previous Next > Install Cancel

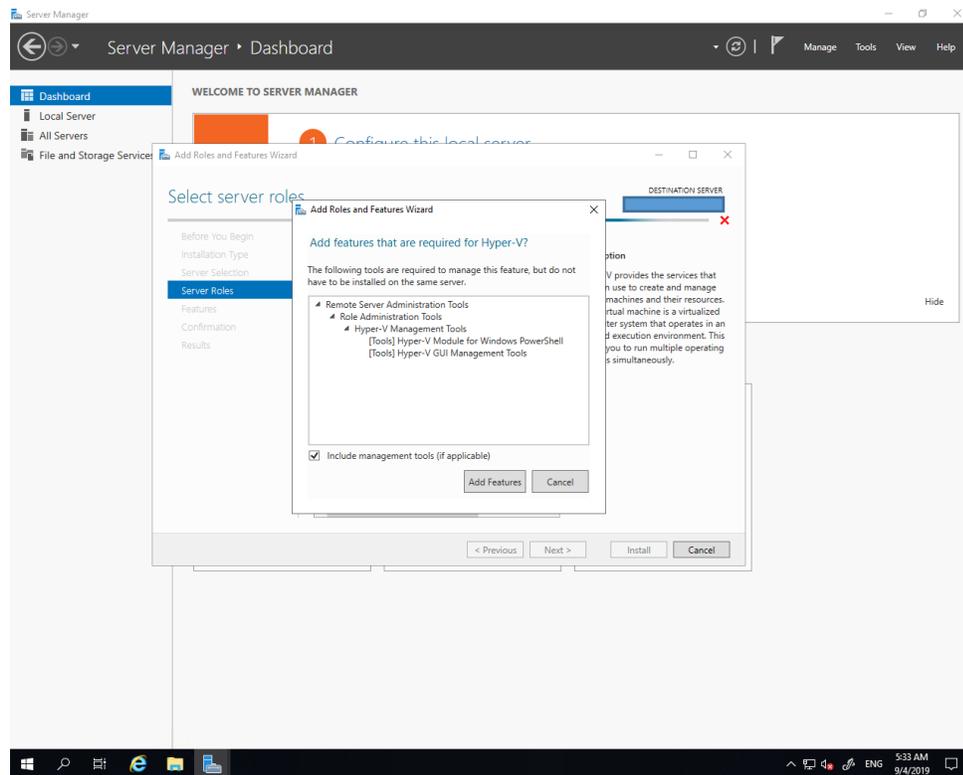
Please click “Close”.



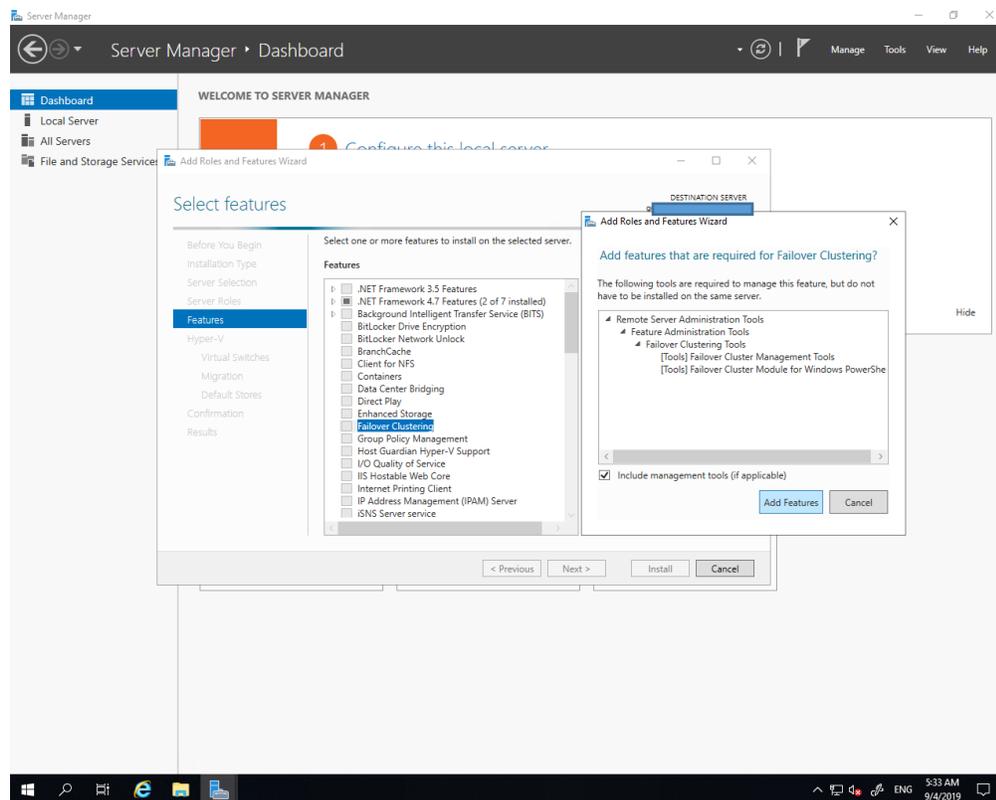
Please do the same thing for Hyper-V. When you select Hyper-V, you will see below.



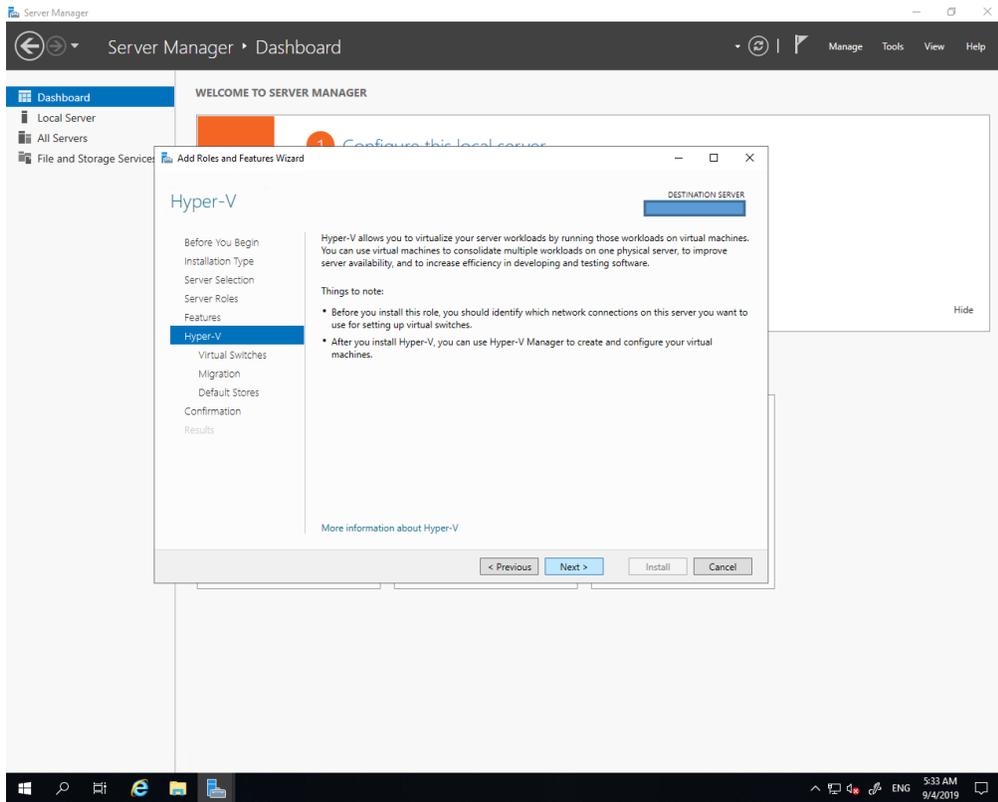
Please click "Add Features".



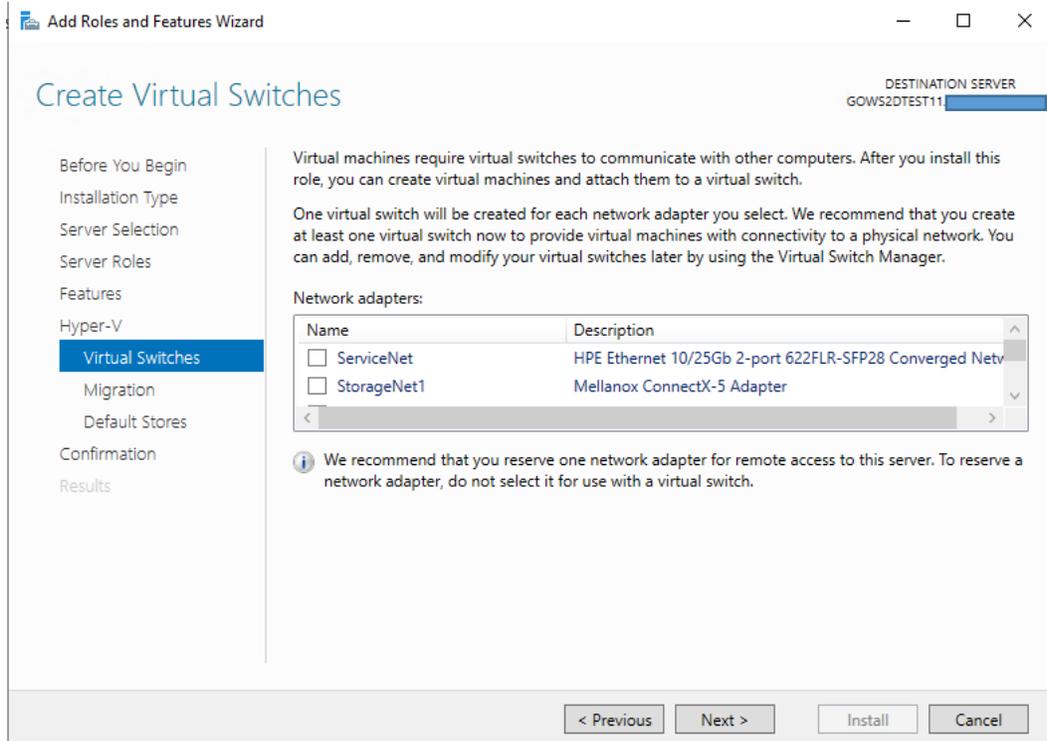
Please select "Failover Clustering". Please click "Add Features".



Please click "Next".



You can create Virtual Switches with ServiceNet. Don't need Management Port.



Create Virtual Switches

DESTINATION SERVER
GOWS2DTEST03

- Before You Begin
- Installation Type
- Server Selection
- Server Roles
- Features
- Hyper-V
 - Virtual Switches**
 - Migration
 - Default Stores
- Confirmation
- Results

Virtual machines require virtual switches to communicate with other computers. After you install this role, you can create virtual machines and attach them to a virtual switch.

One virtual switch will be created for each network adapter you select. We recommend that you create at least one virtual switch now to provide virtual machines with connectivity to a physical network. You can add, remove, and modify your virtual switches later by using the Virtual Switch Manager.

Network adapters:

Name	Description
<input checked="" type="checkbox"/> Embedded FlexibleLOM 1 Port 2	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 Converged Netwo
<input type="checkbox"/> Embedded FlexibleLOM 1 Port 1	HPE Ethernet 10/25Gb 2-port 622FLR-SFP28 Converged Netwo
<input type="checkbox"/> StorageNet3PCIe Slot 2 Port 1	HPE Ethernet 10/25Gb 2-port 621SFP28 Adapter

i We recommend that you reserve one network adapter for remote access to this server. To reserve a network adapter, do not select it for use with a virtual switch.

< Previous Next > Install Cancel

Please ignore and do not set this up. Please click “Next”.

The screenshot shows the Server Manager Dashboard with the 'Add Roles and Features Wizard' window open to the 'Virtual Machine Migration' step. The wizard window has a sidebar with 'Migration' selected. The main content area contains the following text:

Hyper-V can be configured to send and receive live migrations of virtual machines on this server. Configuring Hyper-V now enables any available network on this server to be used for live migrations. If you want to dedicate specific networks for live migration, use Hyper-V settings after you install the role.

Allow this server to send and receive live migrations of virtual machines

Authentication protocol

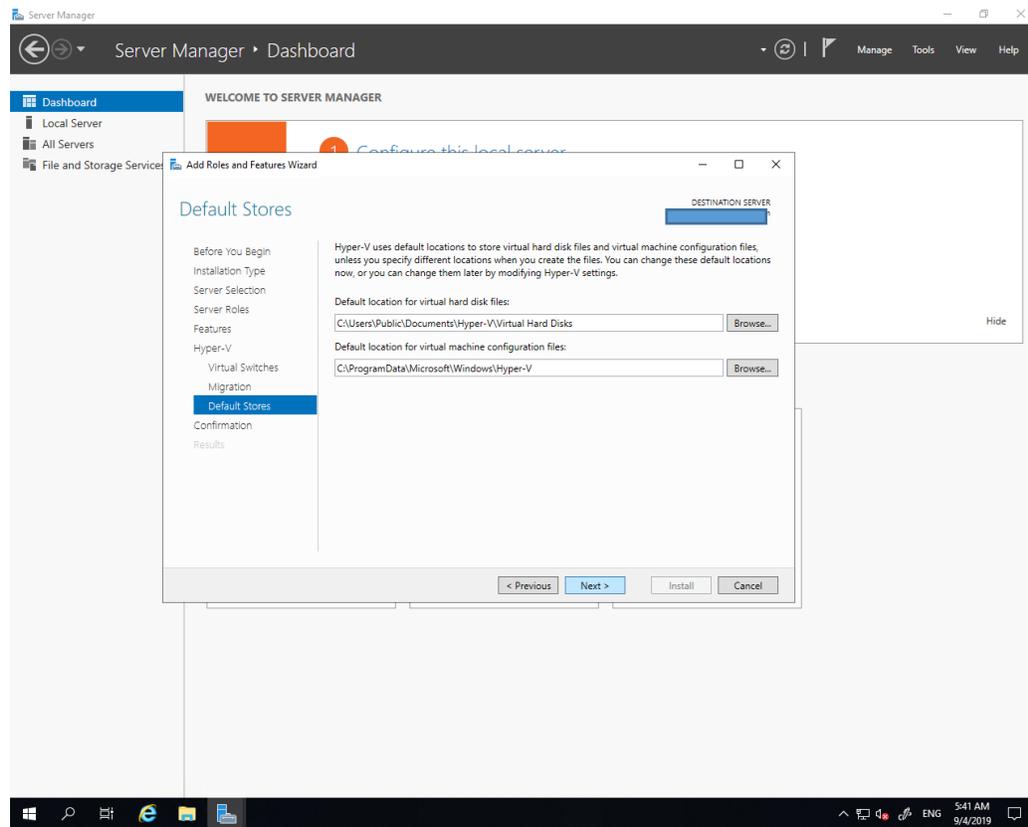
Select the protocol you want to use to authenticate live migrations.

- Use Credential Security Support Provider (CredSSP)
This protocol is less secure than Kerberos, but does not require you to set up constrained delegation. To perform a live migration, you must be logged on to the source server.
- Use Kerberos
This protocol is more secure but requires you to set up constrained delegation in your environment to perform tasks such as live migration when managing this server remotely.

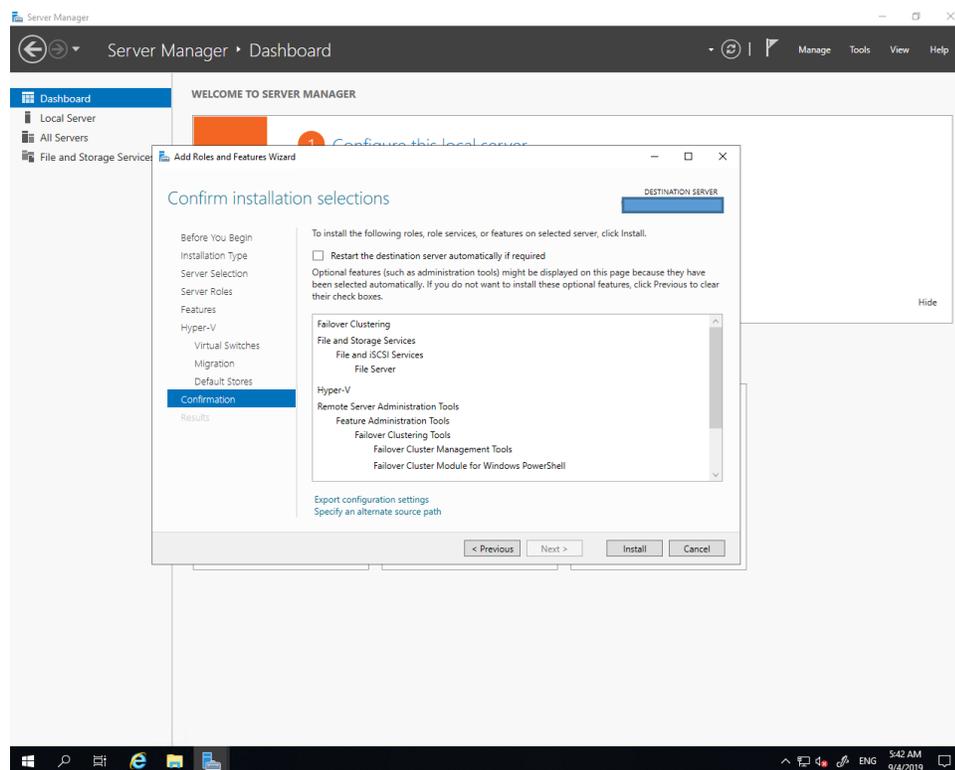
! If this server will be part of a cluster, do not enable migration now. Instead, you will configure the server for live migration, including specifying networks, when you create the cluster.

< Previous Next > Install Cancel

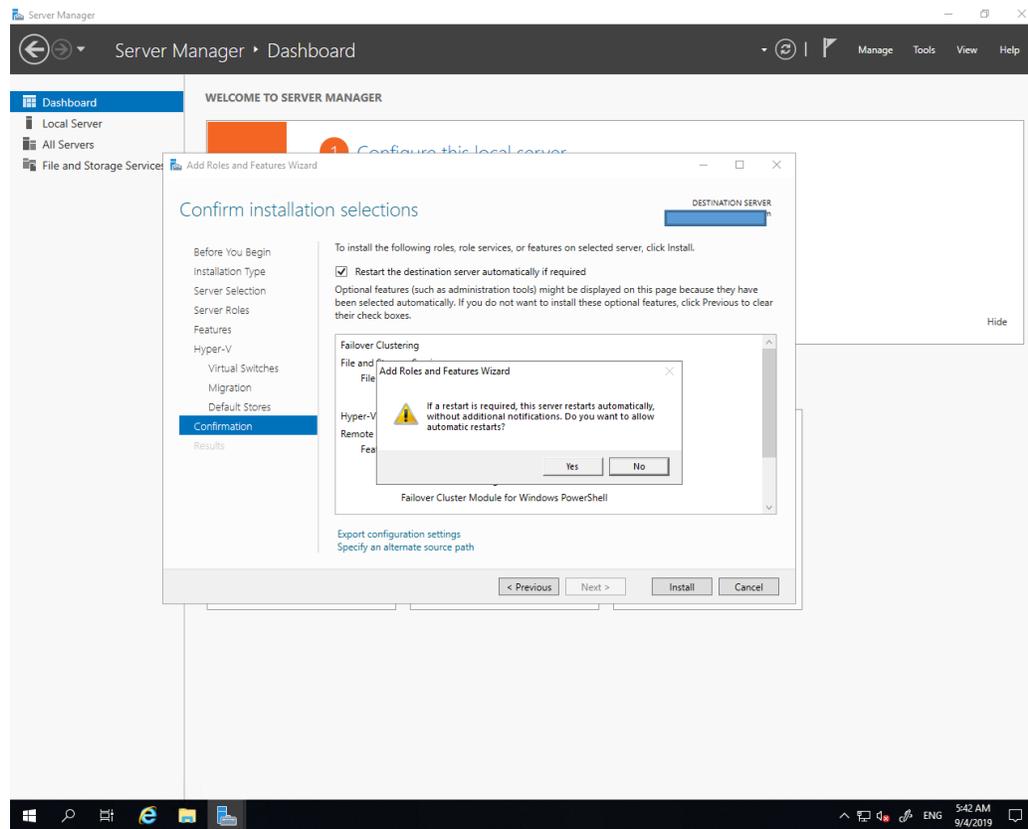
Please click “Next”.



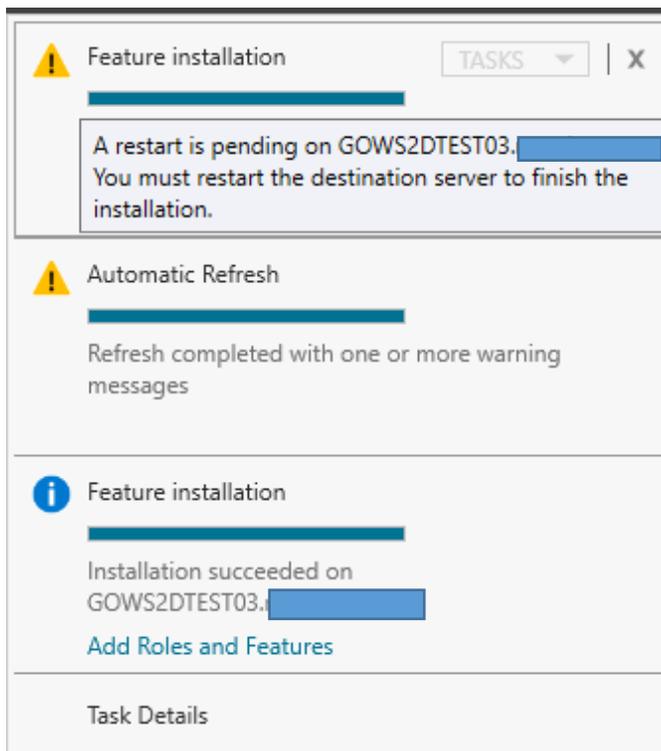
You should see this below.



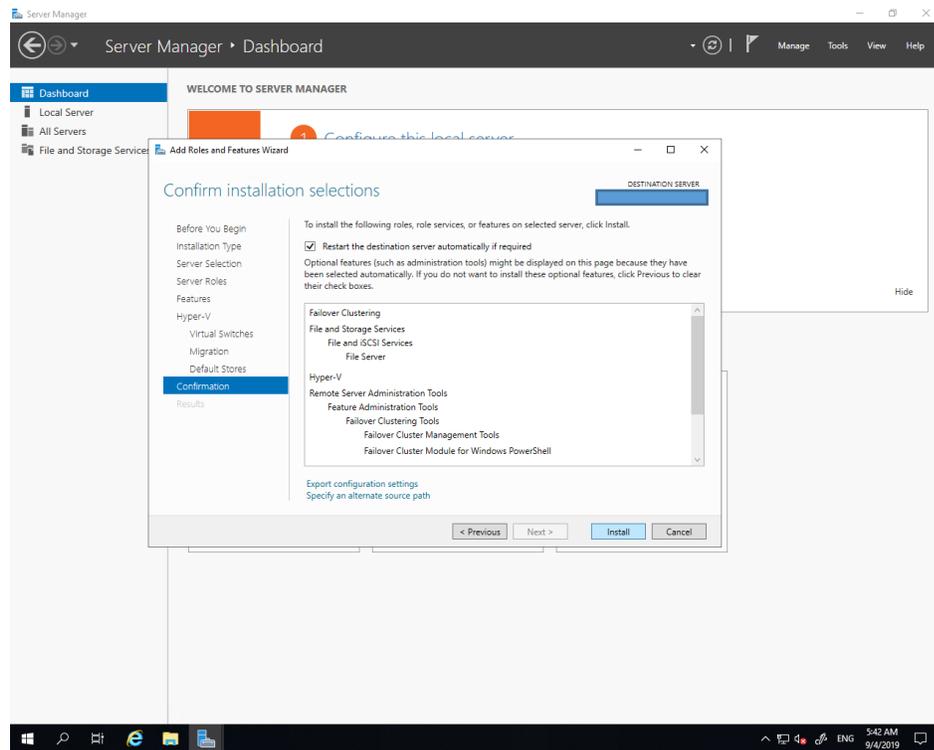
Please select "Restart Option".



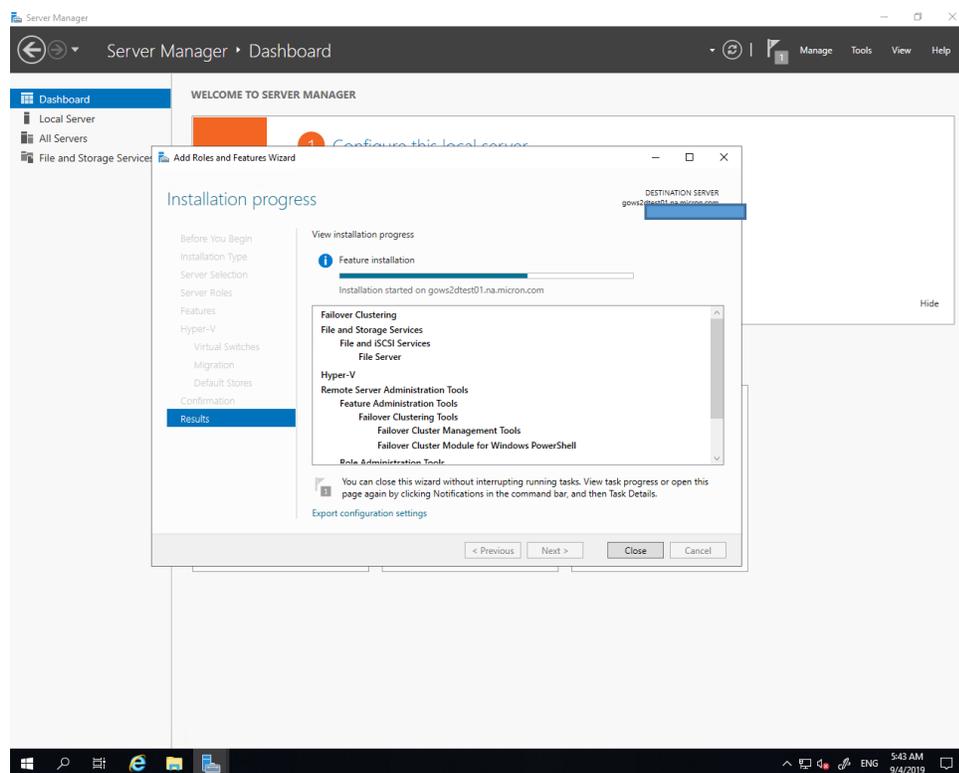
If you did not choose the option, you will see below.



Please click “Install”.



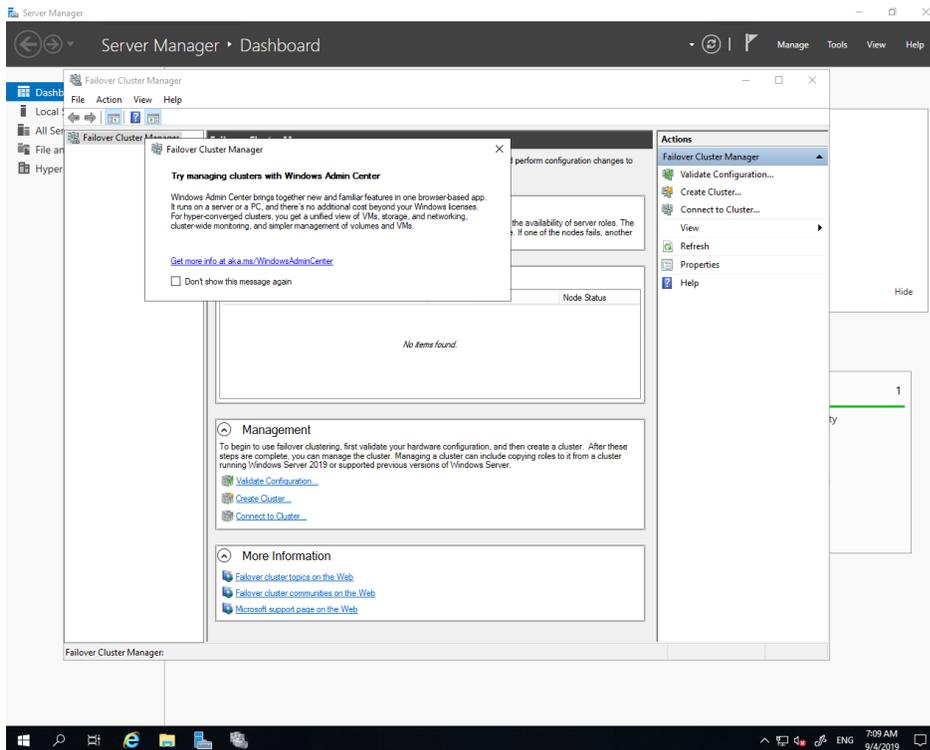
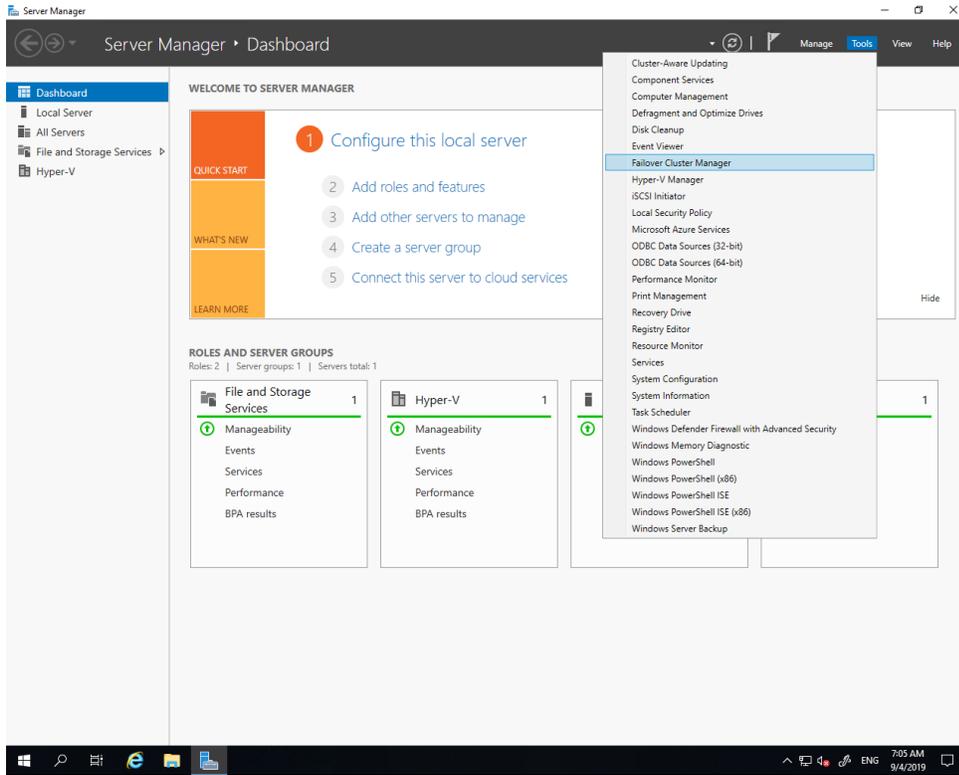
Please click “Close”.

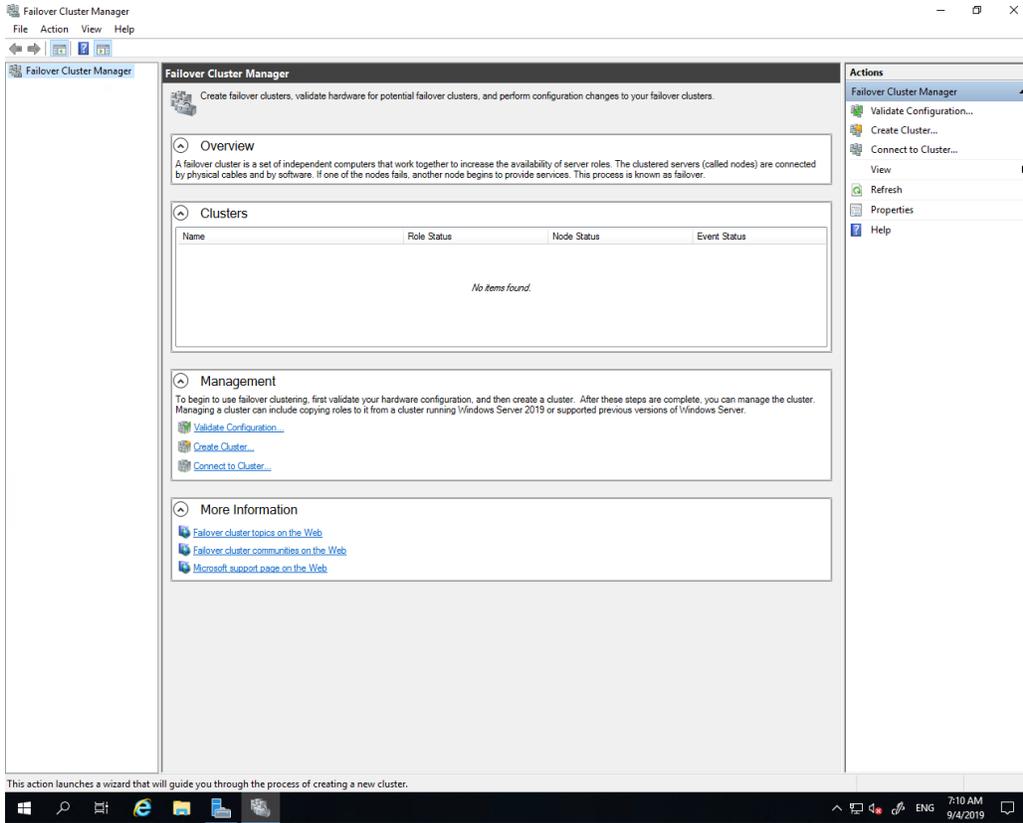


Please configure it on another node also.

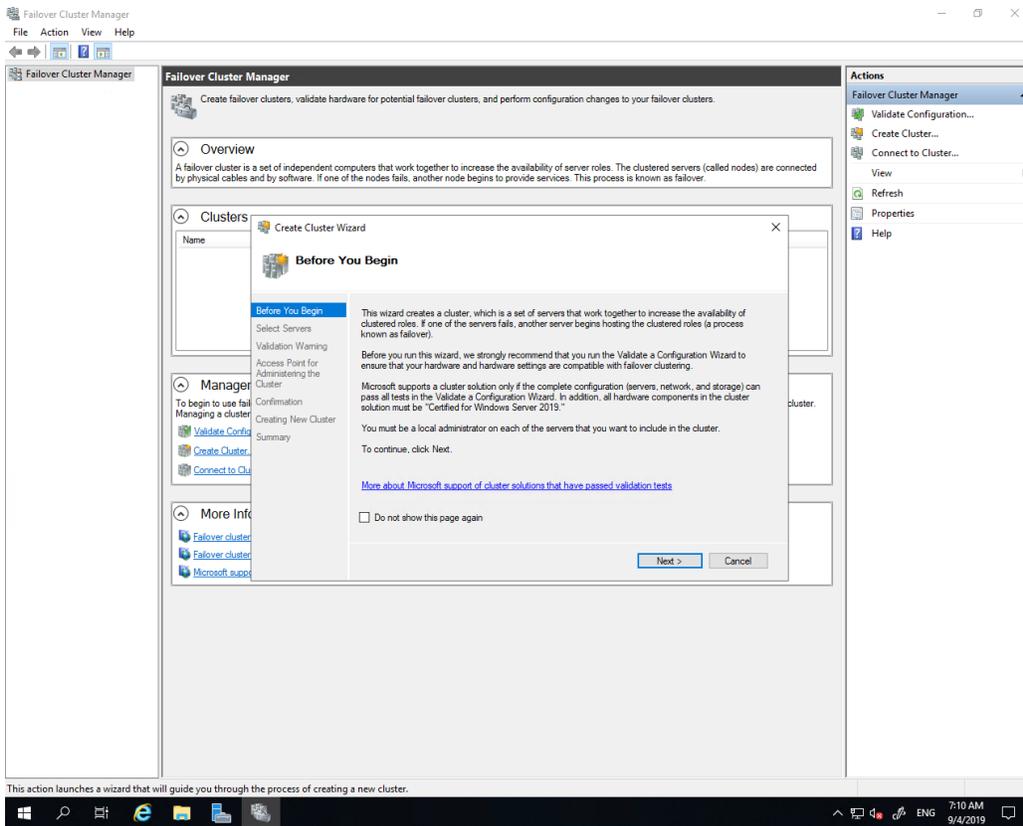
Configure Failover Cluster

Please run Server Manager and click “Failover Cluster Manager” under Tools.

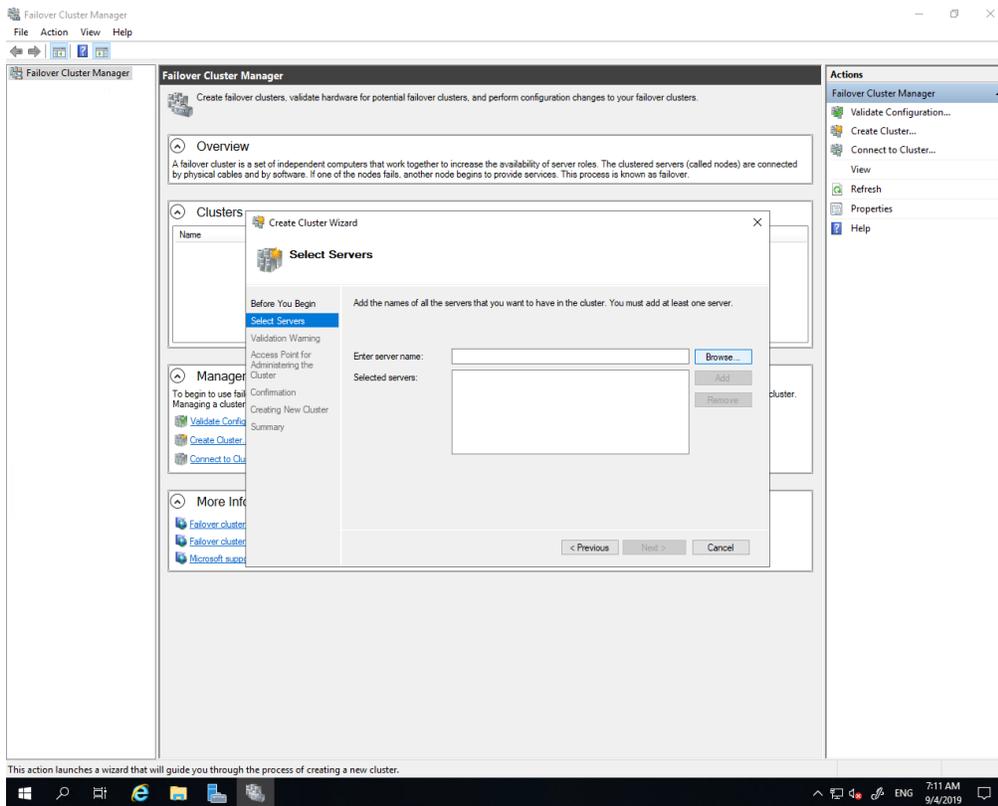




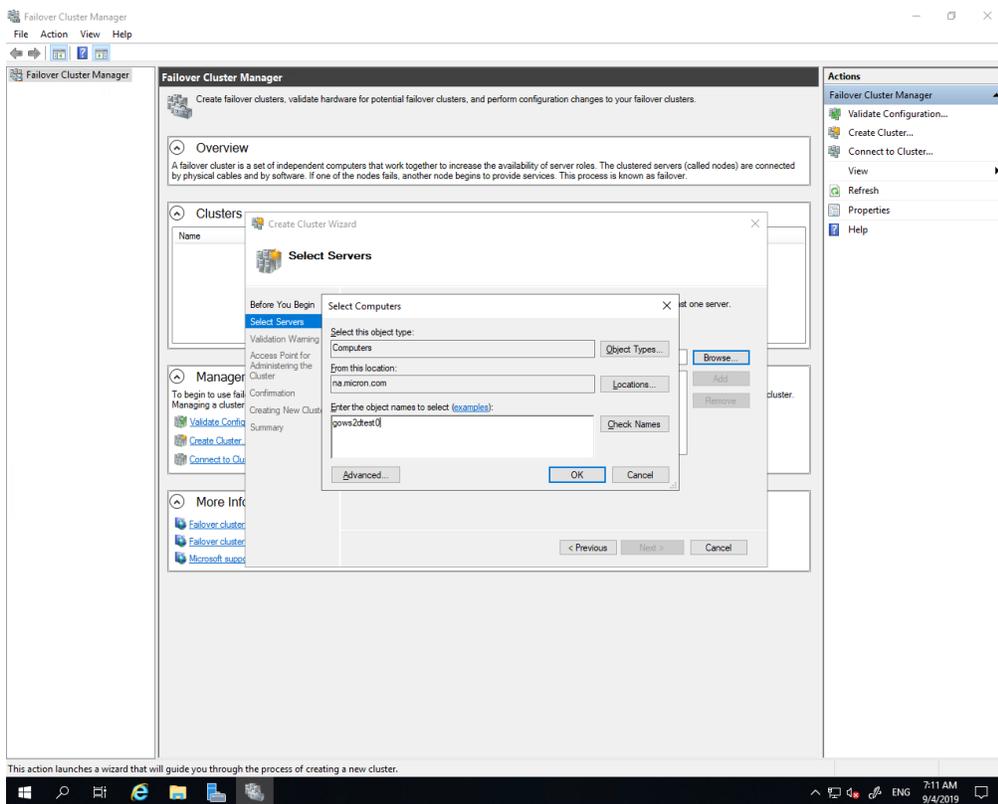
Please click “Create Cluster...”.

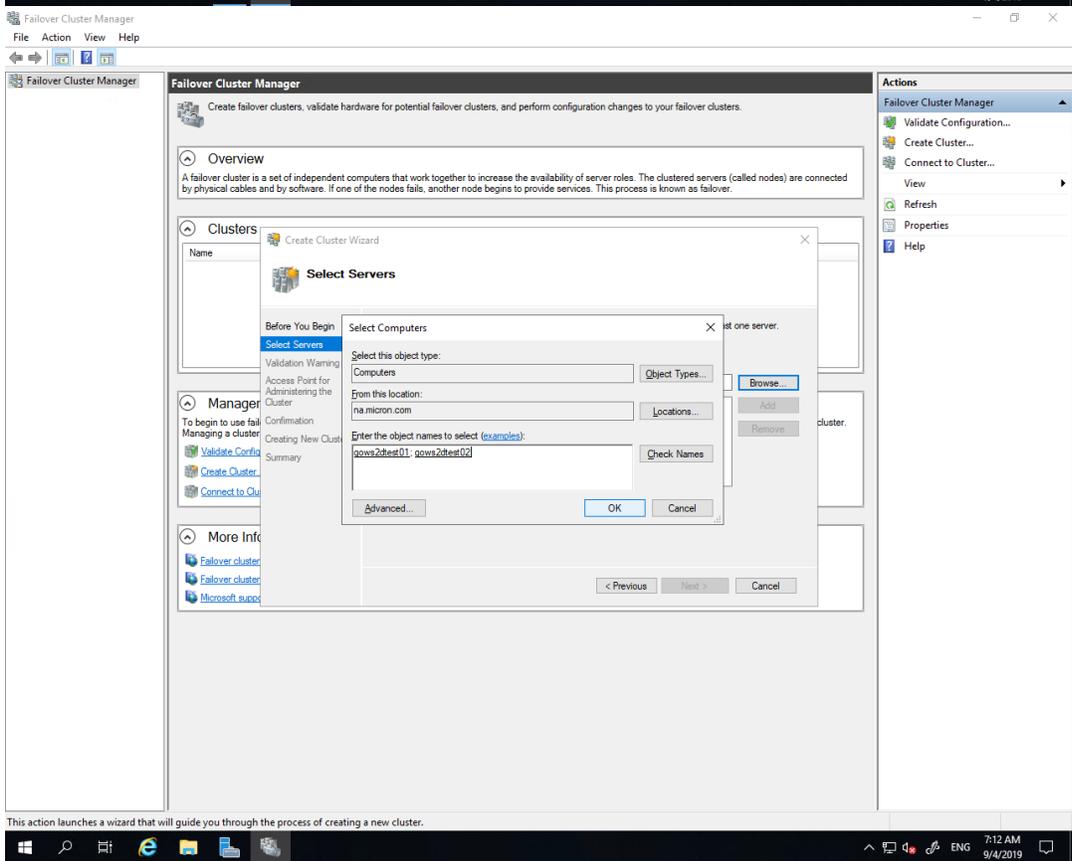
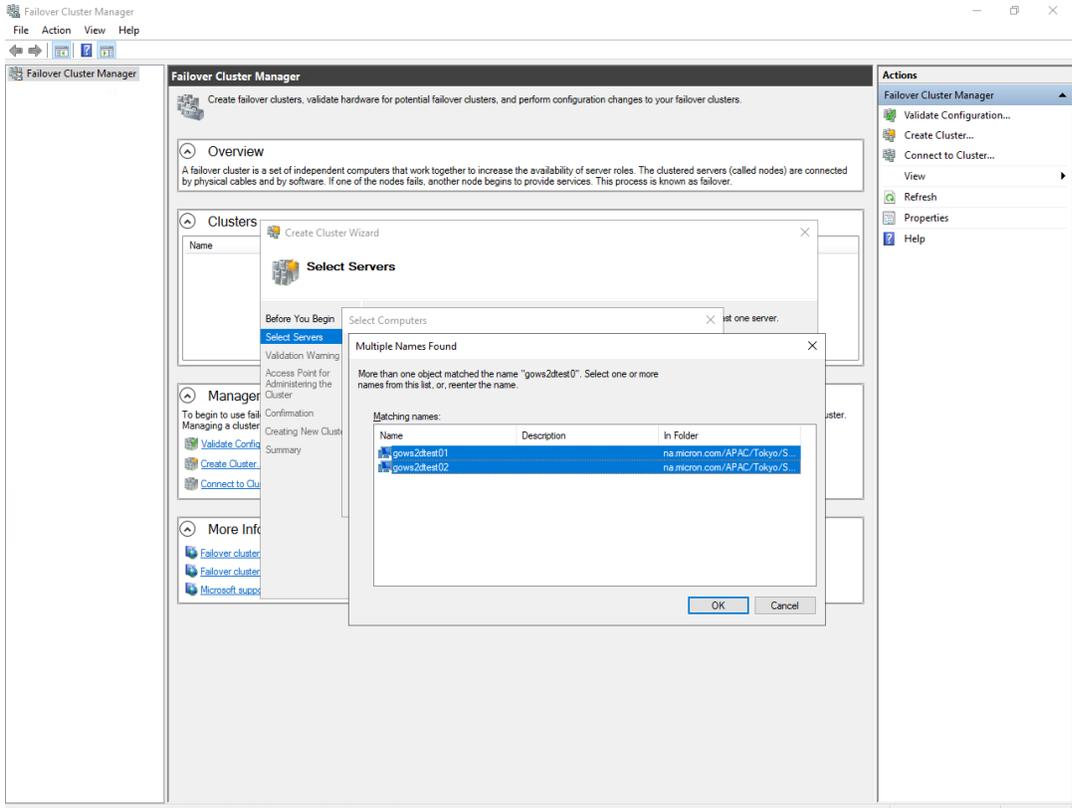


Please click “Browse”

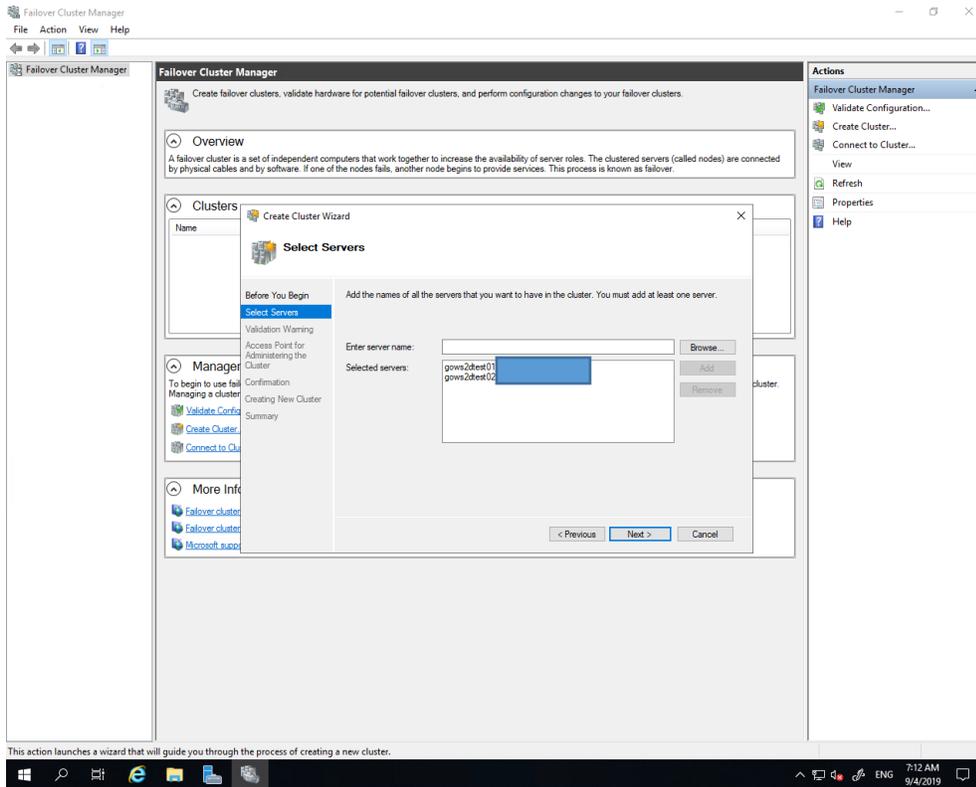


Please enter your node as below.

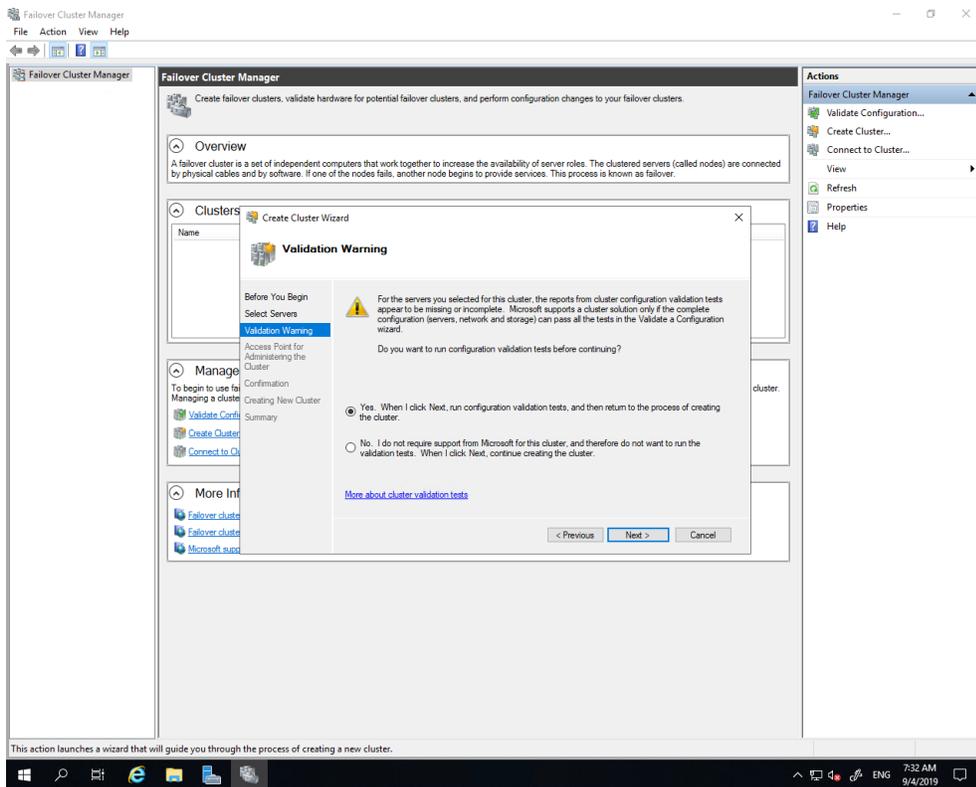




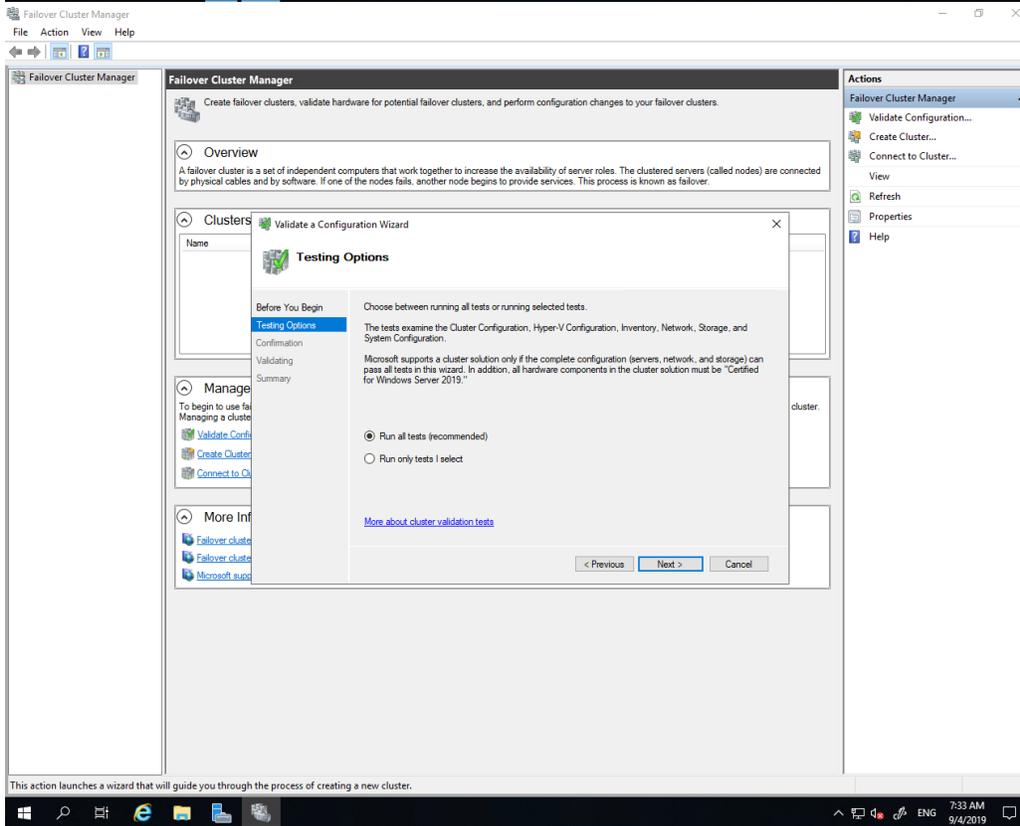
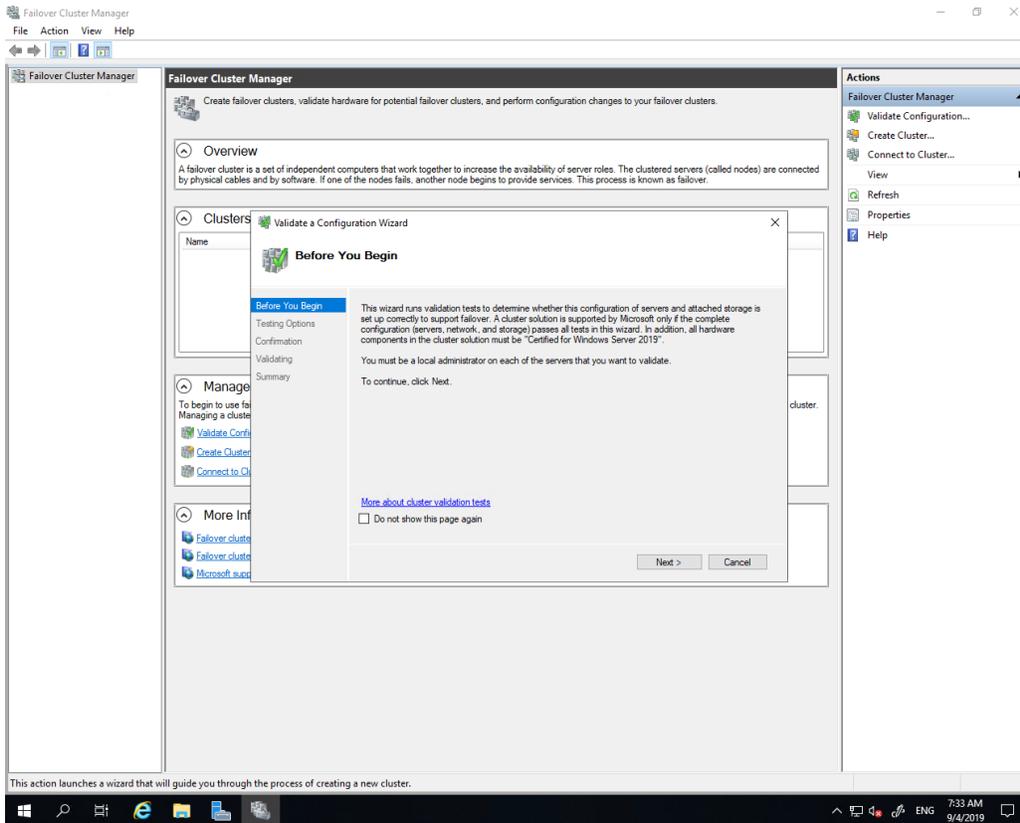
Please click “Next”.



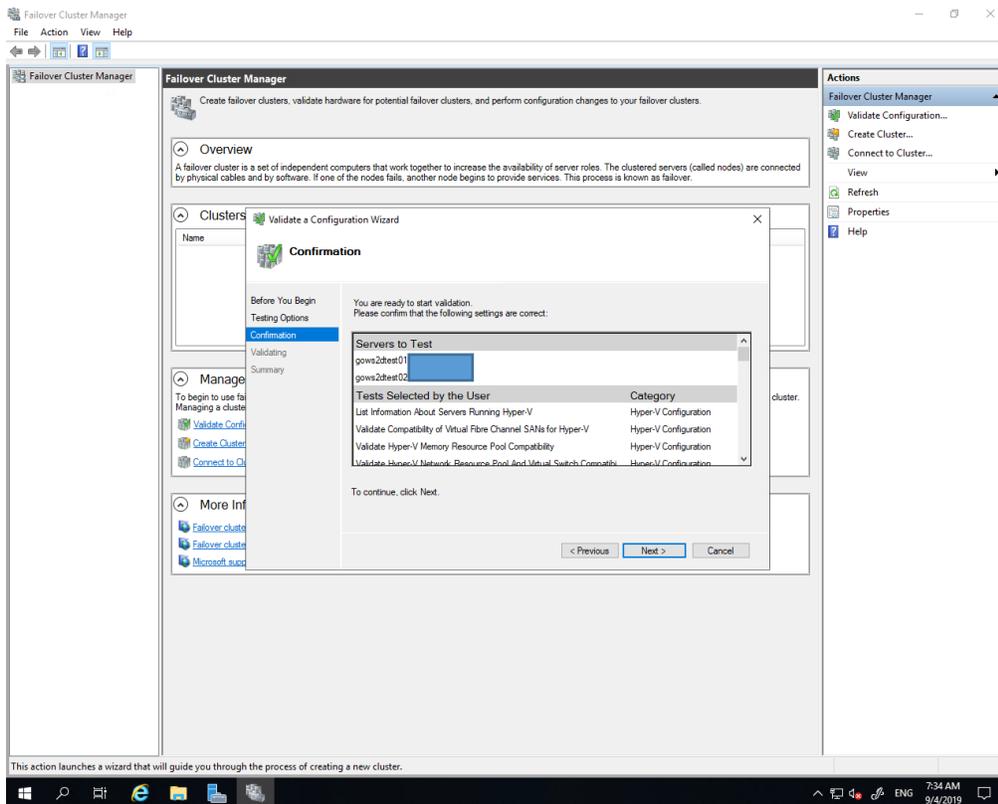
Please click “Next”.



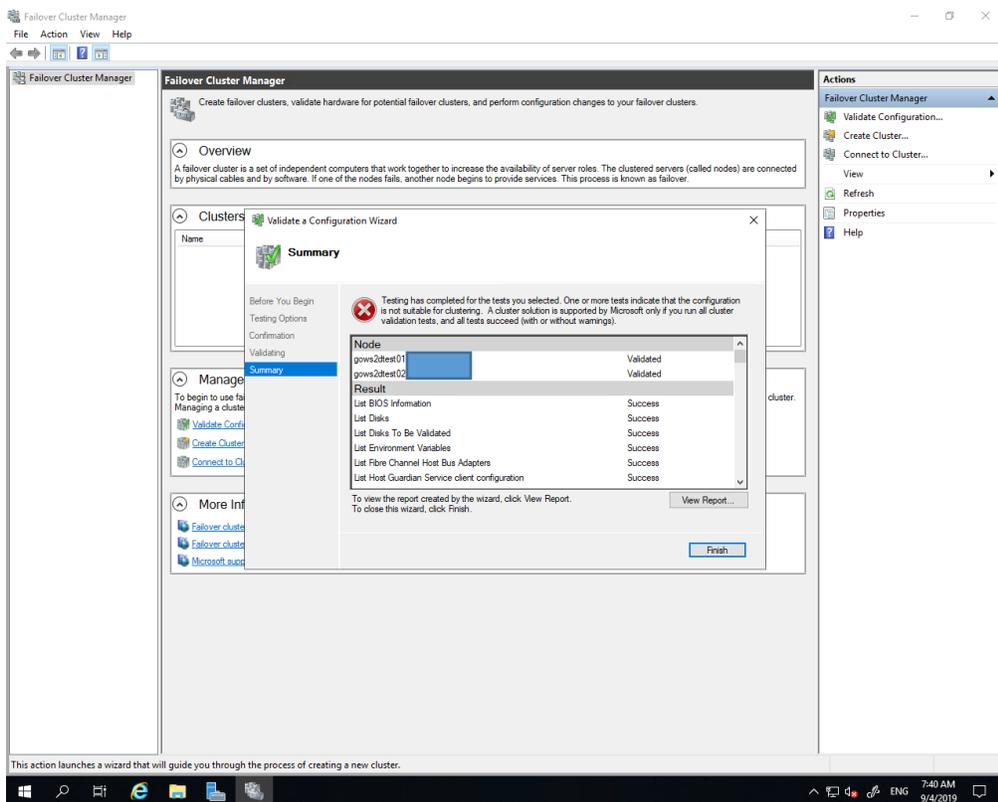
Please click "Next".



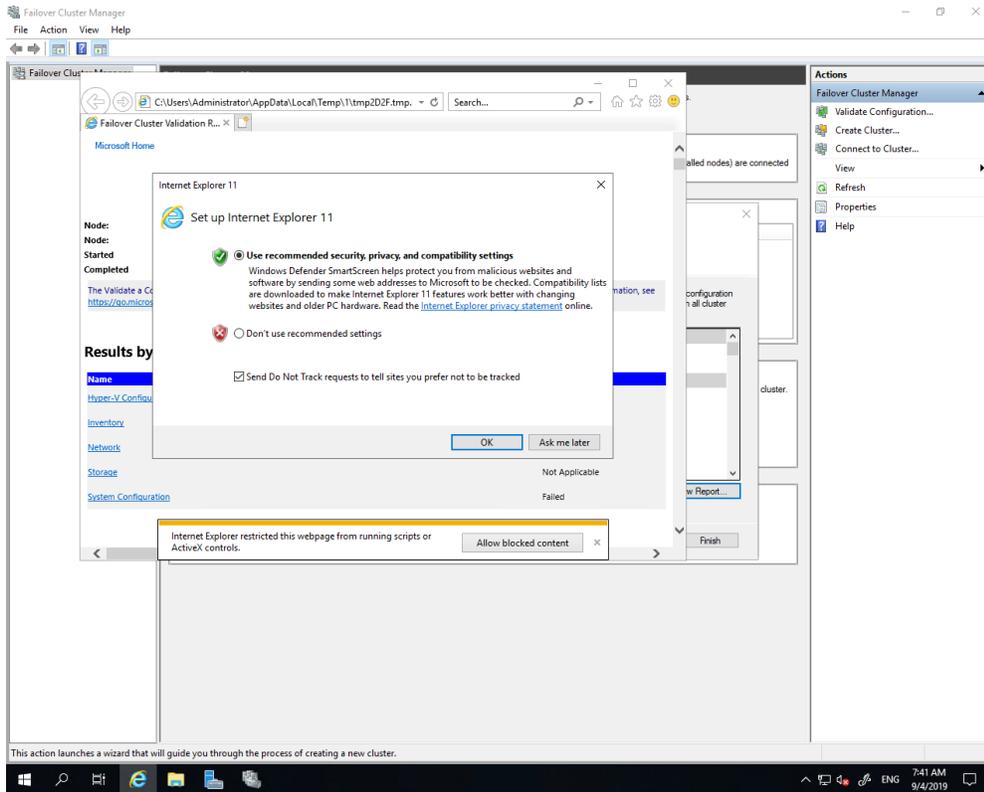
Please click “Next”.



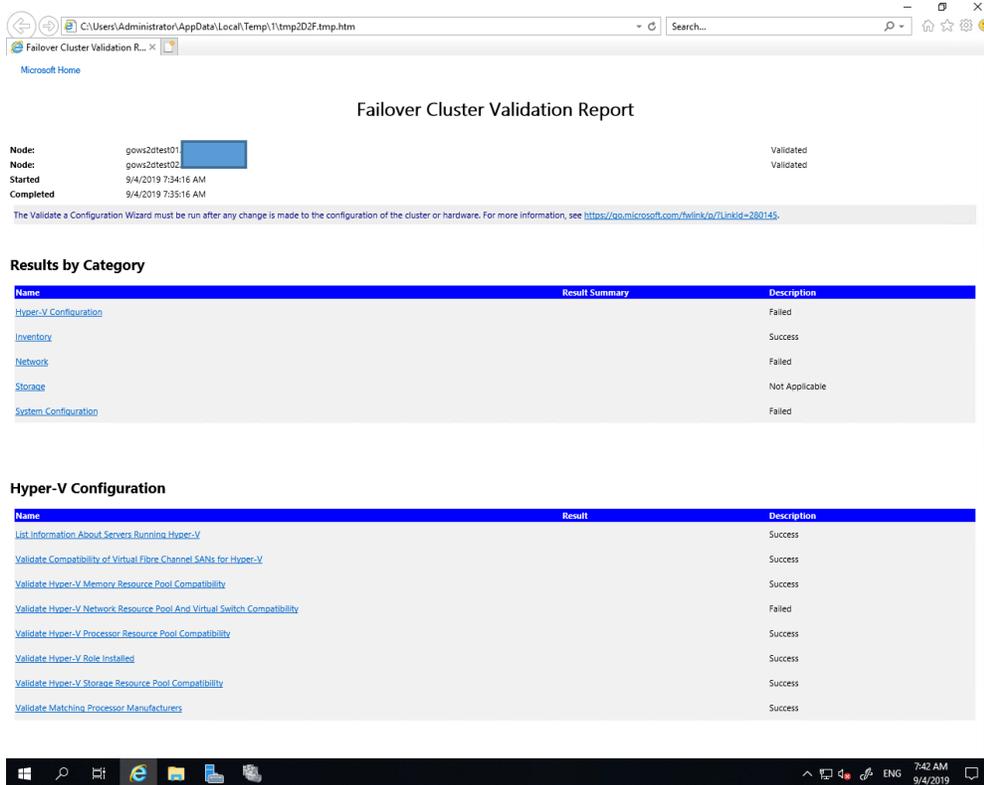
When you see the screen below, please click “View Report”.



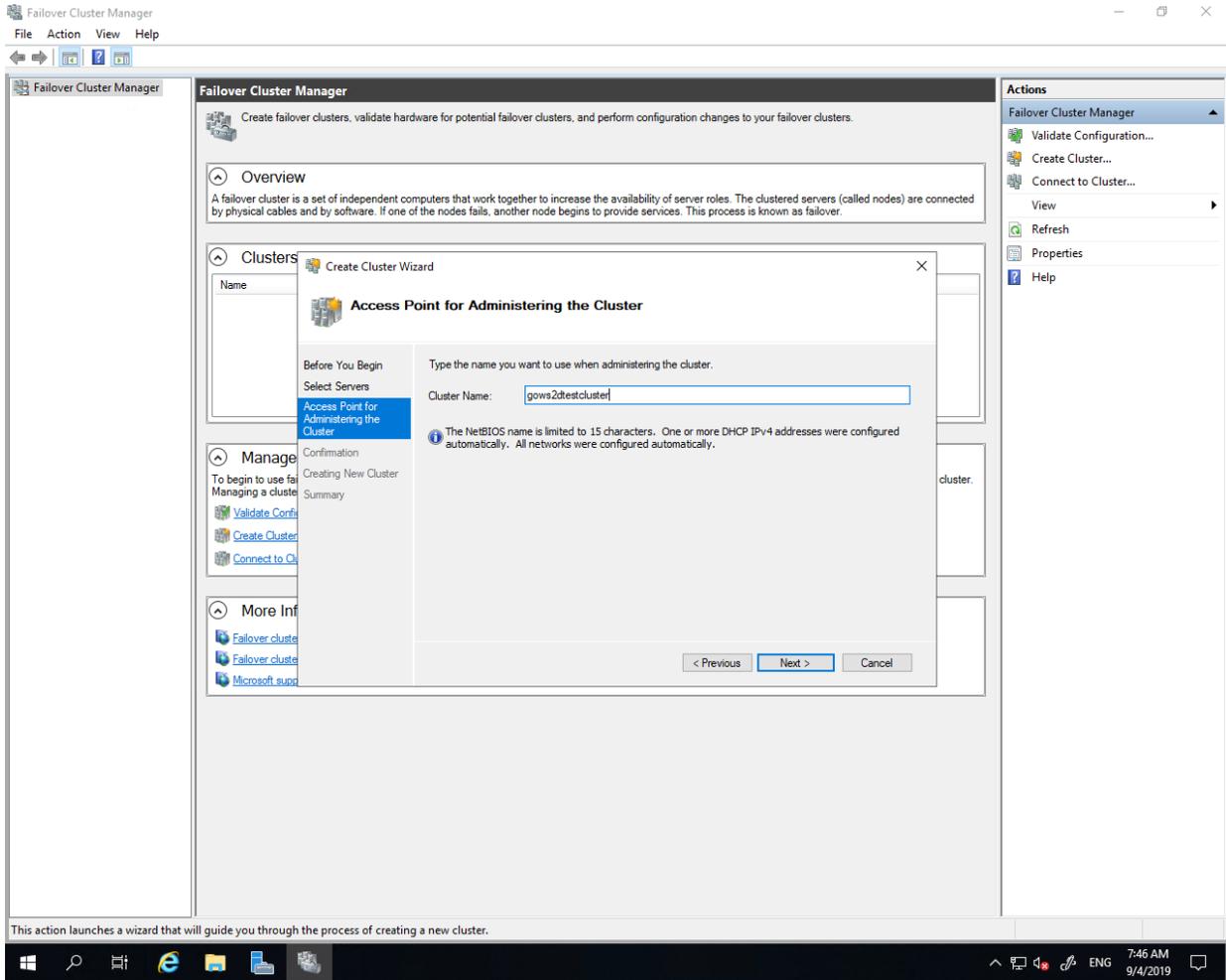
The report will be opened with Internet Explorer.



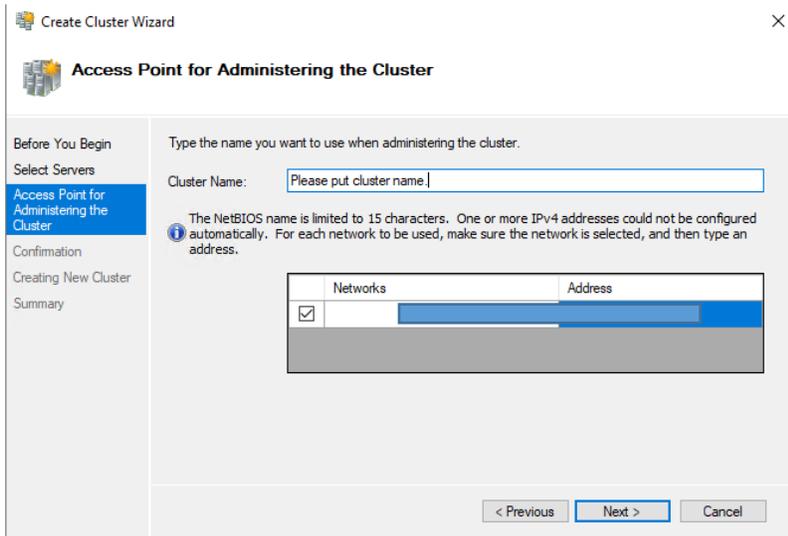
Please check the detail. The Microsoft web page has more technical information.



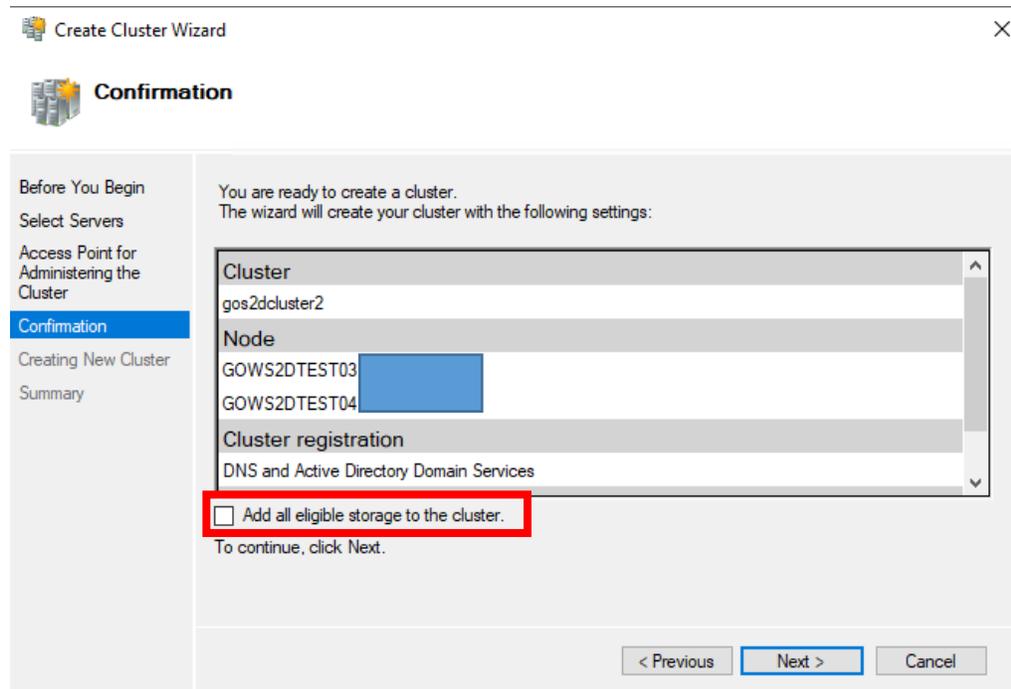
When you pass the validation, please enter “Cluster Name” as below.



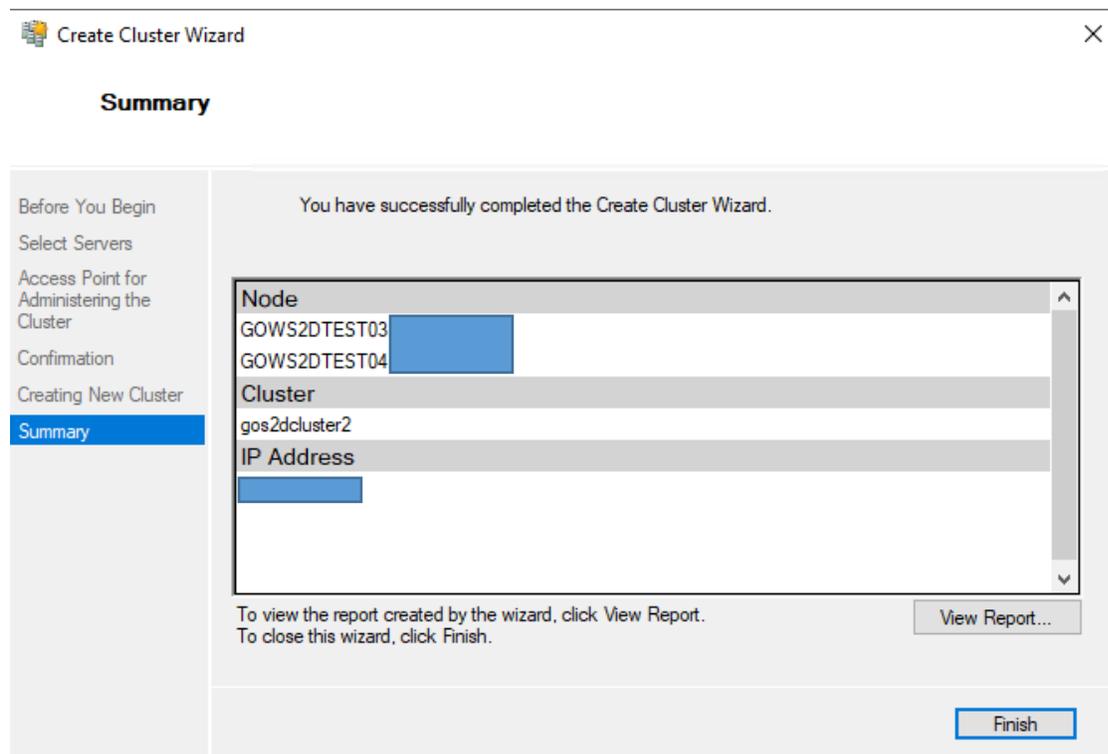
Please enter Cluster name and IP address.



You will see below. please remove the check box of “Add all eligible storage to the cluster.”. Please click “Next”. Note: If you enable the check box, you may re-create the Storage Spaces Direct with power shell command.

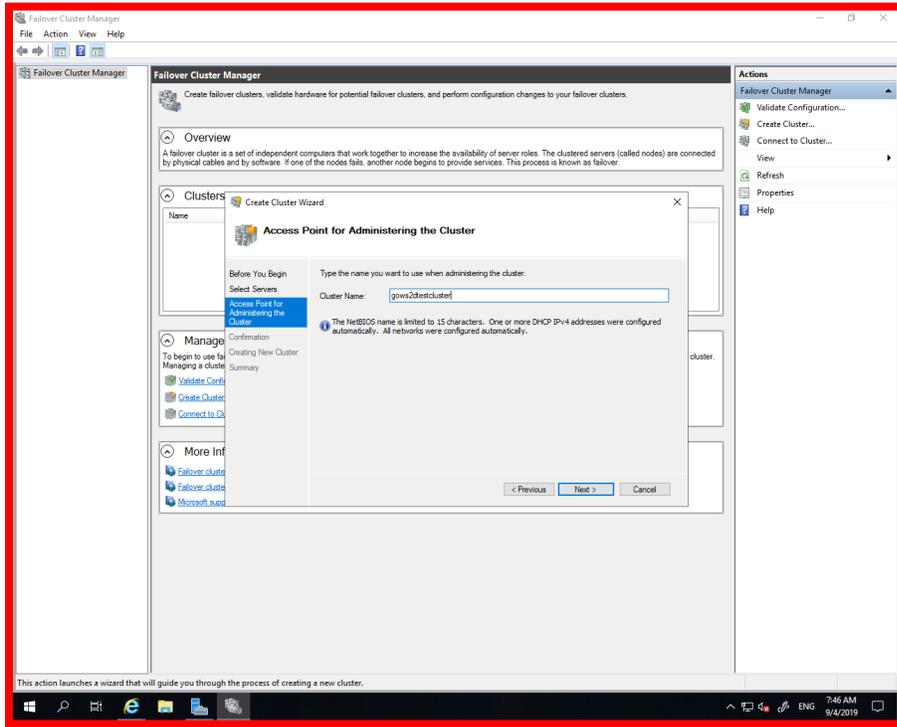


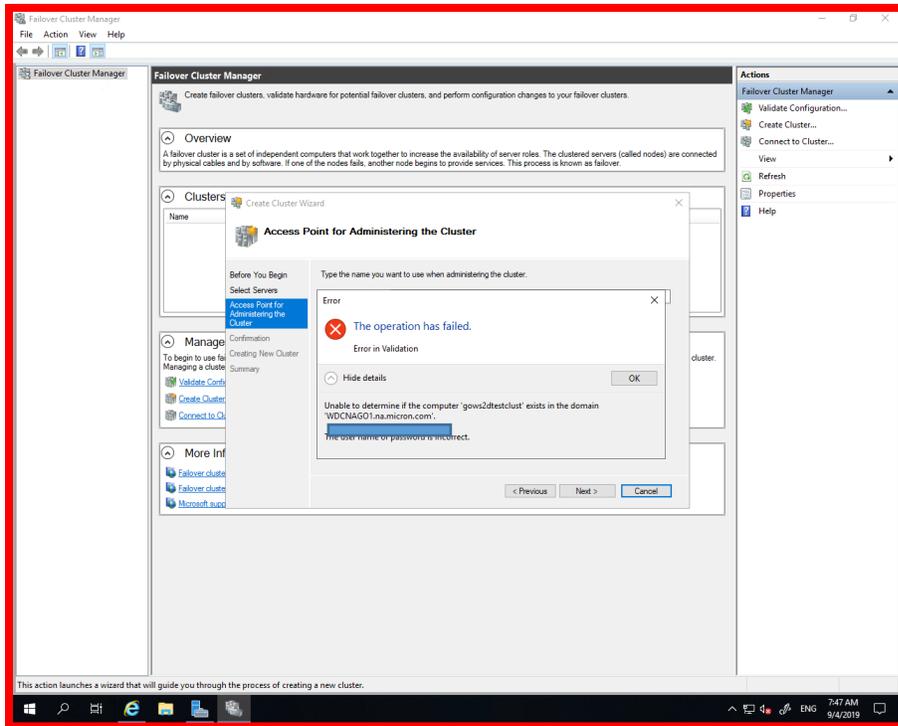
Please click “Finish”.



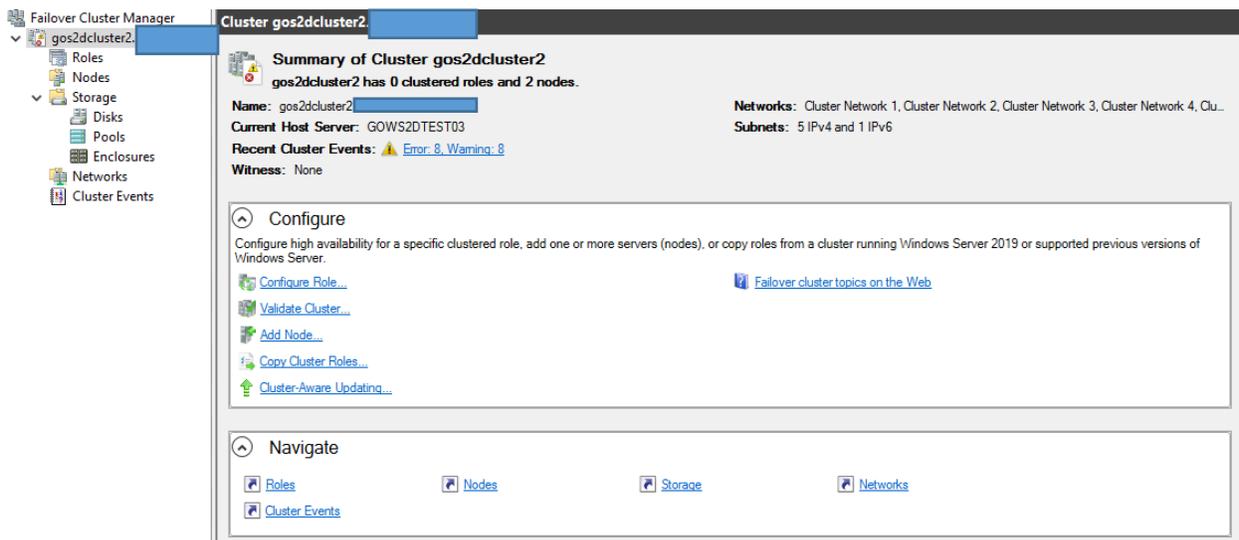
Troubleshooting:

If you do not have enough AD permission to do organization units (OU), you will see the screen below. Ask your Windows domain admins to input a credential for you with enough permissions.





Please confirm new cluster is working well or not with below process. Please open the failover cluster manager. Please click the new one which you created. Please check the summary.



Please click the “Nodes” in left pain. Please confirm all node are UP.

Failover Cluster Manager

File Action View Help



Failover Cluster Manager

- ▼ gos2dcluster2.
 Roles
- Nodes
- ▼ Storage
 Disks
- Pools
- Enclosures
- Networks
- Cluster Events

Nodes (2)

Search

Name	Status
GOWS2DTEST03	Up
GOWS2DTEST04	Up

Witness for Cluster

If you are not familiar with Witness, the below link has more detail about it.

English

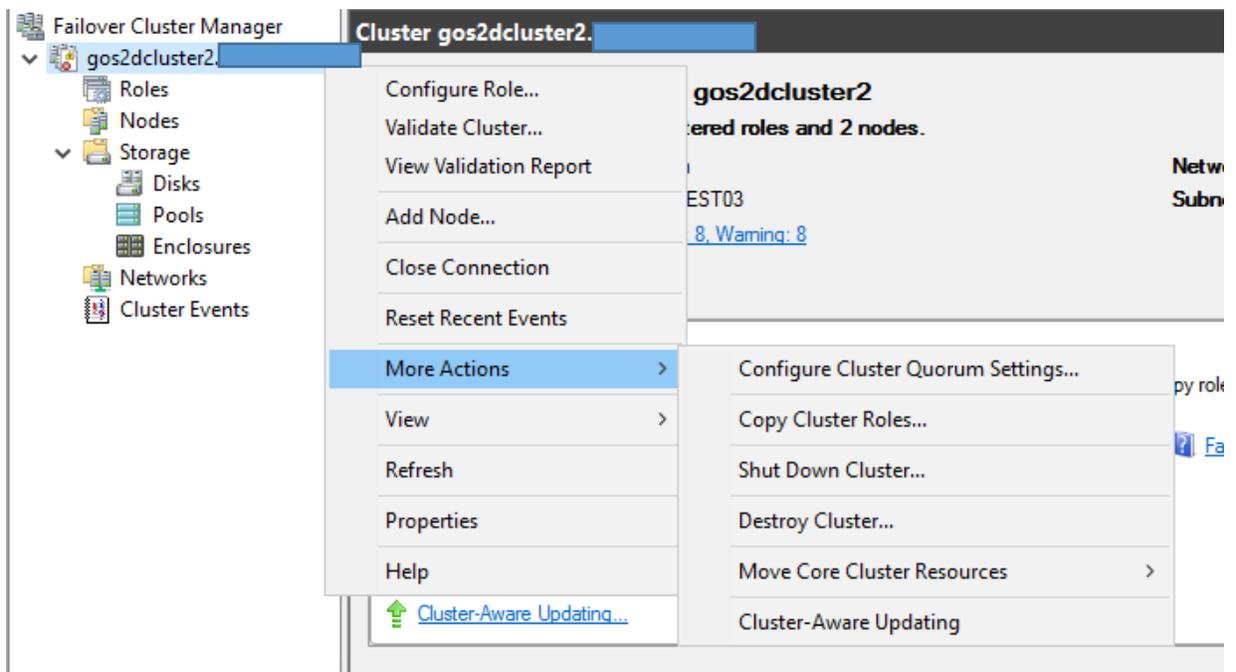
<https://docs.microsoft.com/en-us/windows-server/failover-clustering/deploy-cloud-witness#cloud-witness-overview>

Japanese

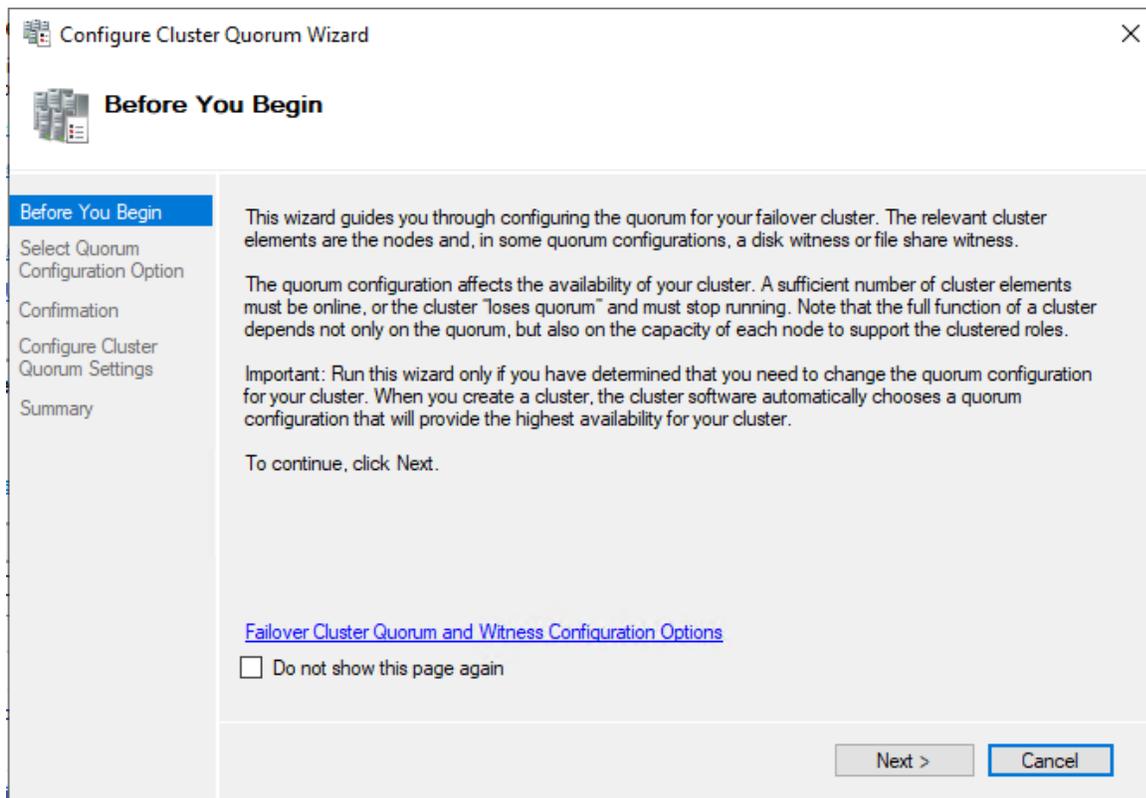
<https://docs.microsoft.com/ja-jp/windows-server/failover-clustering/deploy-cloud-witness#cloud-witness-overview>

Please open Failover Cluster Manager. Right click on cluster as shown.

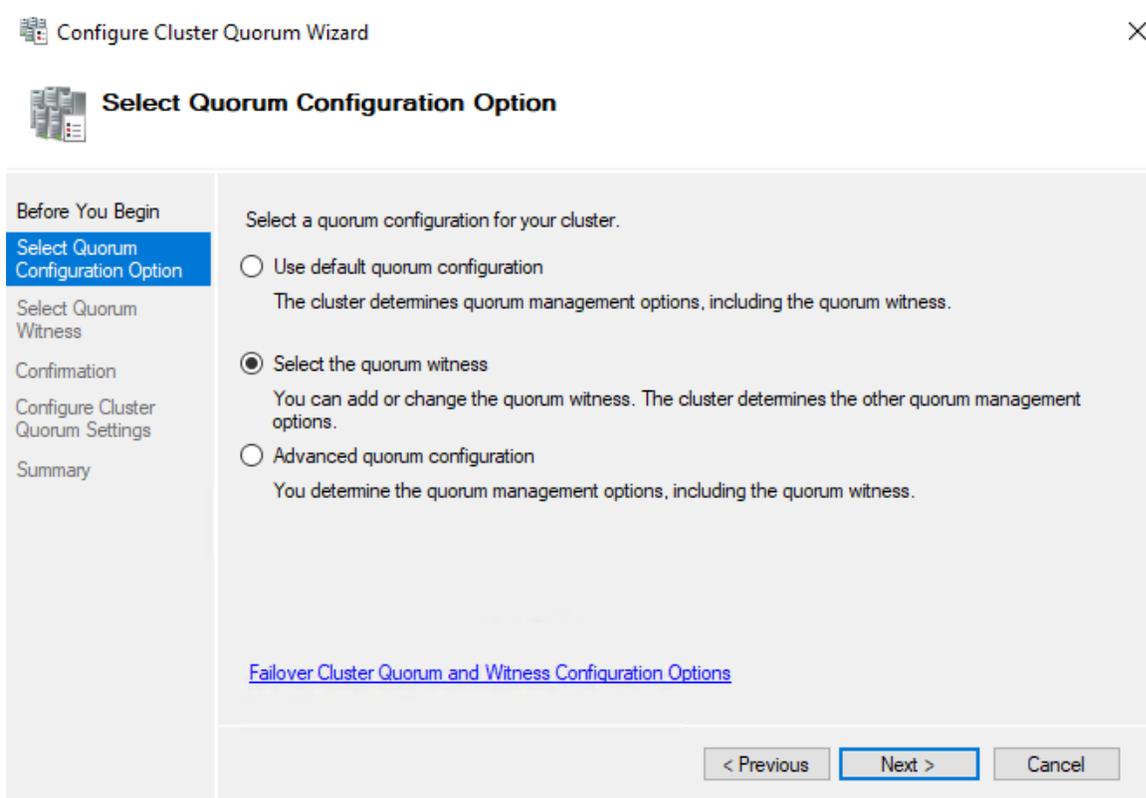
Please click “Configure Cluster Quorum Settings”



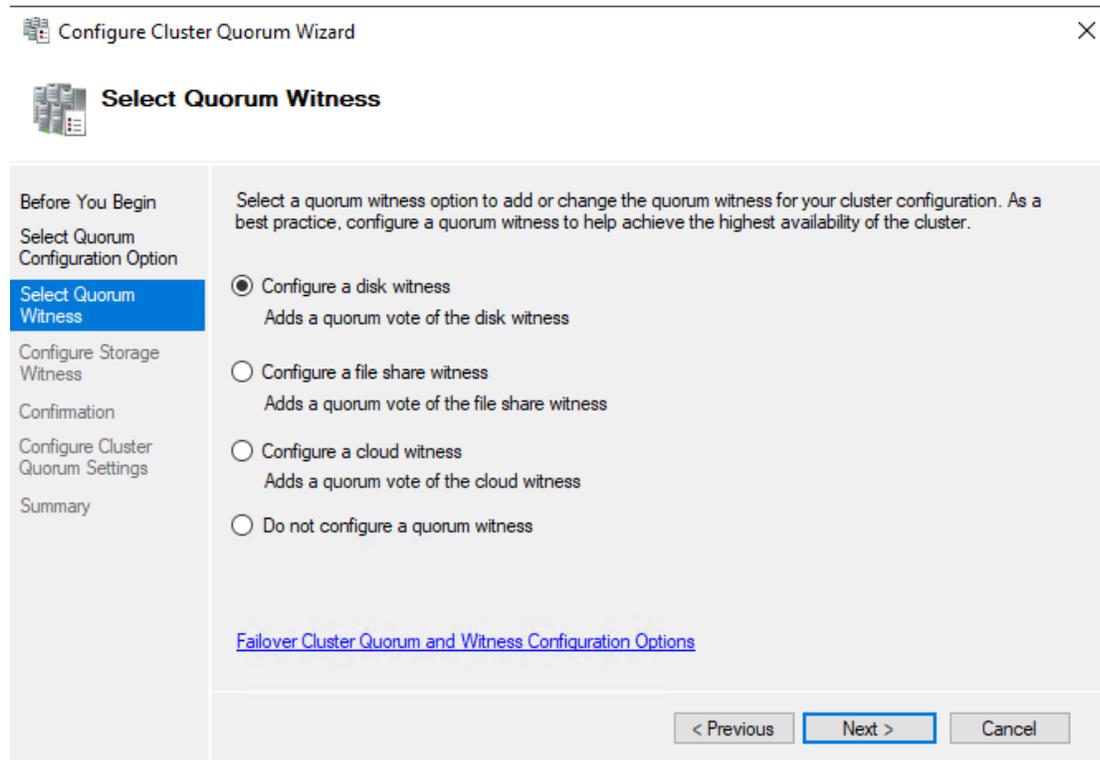
Please click “Next”.



Please choose “Select the quorum witness”.



You will see below options.



However, you only have two options. One is cloud Witness, and one is “Configure a file share witness”.

Note: Configure a Disk Witness will consume your DAS so the first option is not available with Azure stack HCI.

If you have cloud environment, it will be best choice. If not, please select “a file share witness” option.

Configure Cluster Quorum Wizard

Select Quorum Witness

Before You Begin

Select Quorum Configuration Option

Select Quorum Witness

Configure File Share Witness

Confirmation

Configure Cluster Quorum Settings

Summary

Select a quorum witness option to add or change the quorum witness for your cluster configuration. As a best practice, configure a quorum witness to help achieve the highest availability of the cluster.

- Configure a disk witness
Adds a quorum vote of the disk witness
- Configure a file share witness
Adds a quorum vote of the file share witness
- Configure a cloud witness
Adds a quorum vote of the cloud witness
- Do not configure a quorum witness

[Failover Cluster Quorum and Witness Configuration Options](#)

< Previous Next > Cancel

Please create new shared folder. And Please point it as below.

Configure Cluster Quorum Wizard

Configure File Share Witness

Before You Begin

Select Quorum Configuration Option

Select Quorum Witness

Configure File Share Witness

Confirmation

Configure Cluster Quorum Settings

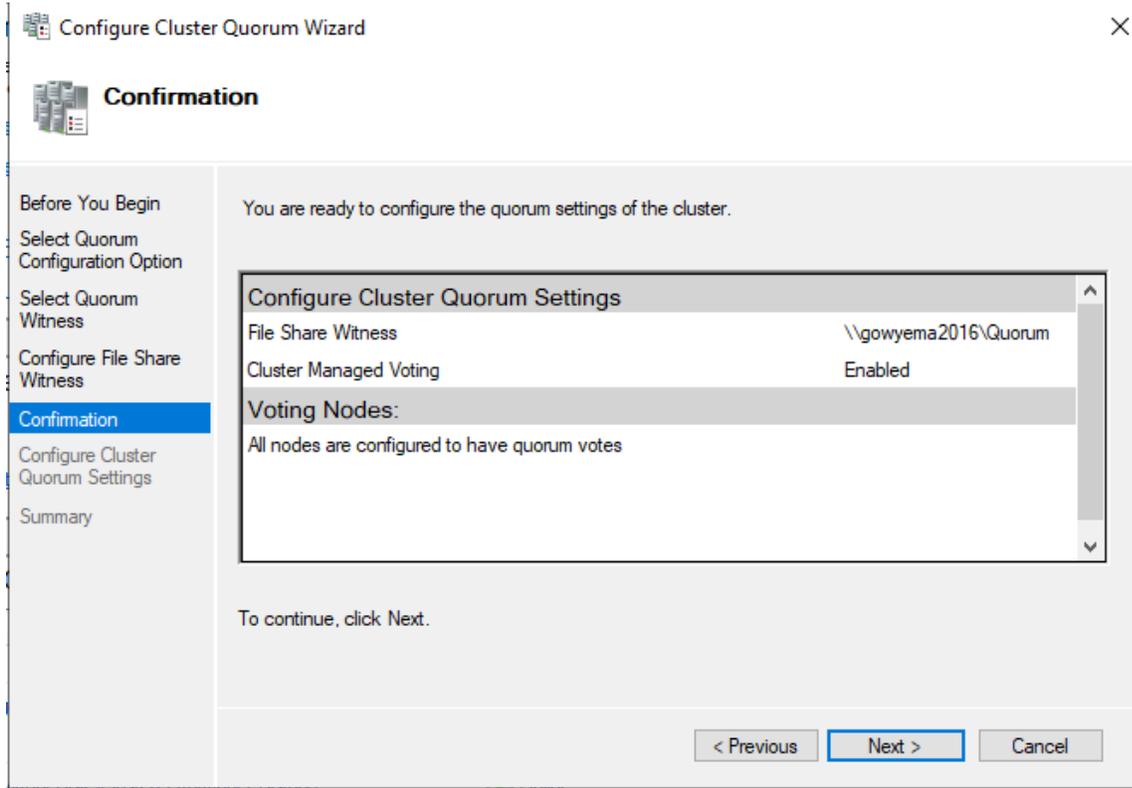
Summary

Please select a file share that will be used by the file share witness resource. This file share must not be hosted by this cluster. It can be made more available by hosting it on another cluster.

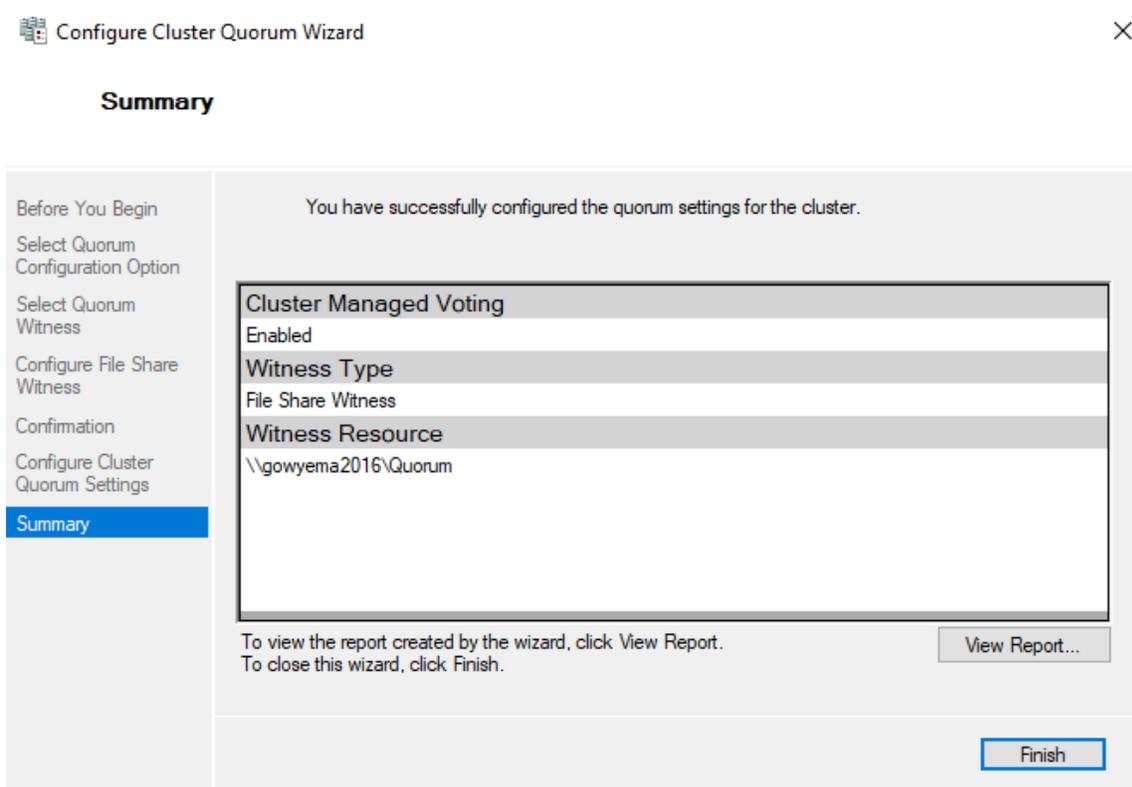
File Share Path:

< Previous Next > Cancel

If it is working well, you will see below result. Please click “Next”.



Please click “Finish”.



When you click “View report”, you can see the results.



Configure Cluster Quorum Settings

Witness Type: File Share Witness
Witness Resource: \\gowyema2016\Quorum2
Cluster Managed Voting: Enabled
Started 1/23/2020 12:10:23 AM
Completed 1/23/2020 12:10:23 AM

All nodes are configured to have quorum votes

Your cluster quorum configuration will be changed to the configuration shown above.

Node votes	Old Value	New Value	Status
GOWS2DTEST03	1	1	Unchanged
GOWS2DTEST04	1	1	Unchanged

Please click Finish.

You can check the result with Windows Admin Center if you already have it. Open it and click “Add” in Failover cluster Manager as below.

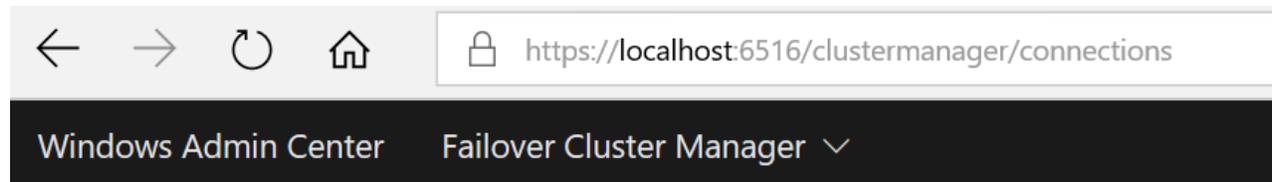
If you are not familiar with Windows Admin Center (WAC), please refer to the link below. You can access more details, including how to install it, and its many powerful functions.

English

<https://www.microsoft.com/en-us/windows-server/windows-admin-center>

Japanese

<https://www.microsoft.com/ja-jp/windows-server/windows-admin-center>



Failover cluster connections

Name ↑

Please put correct credential.

Failover clusters

Connection tags ⓘ

+ Add tags

Add cluster Import clusters

Cluster name *

gos2dcluster2

 Access was denied to "gos2dcluster2". You can still add it to your connections list, but you'll need to provide administrator credentials to connect to the cluster.

- Use my Windows account for this connection
- Use Local Administrator Password Solution with a randomized password (must already be set up)

Local administrator account name

administrator

- Use another account for this connection

Username *

Enter username...

Password *

Enter password.

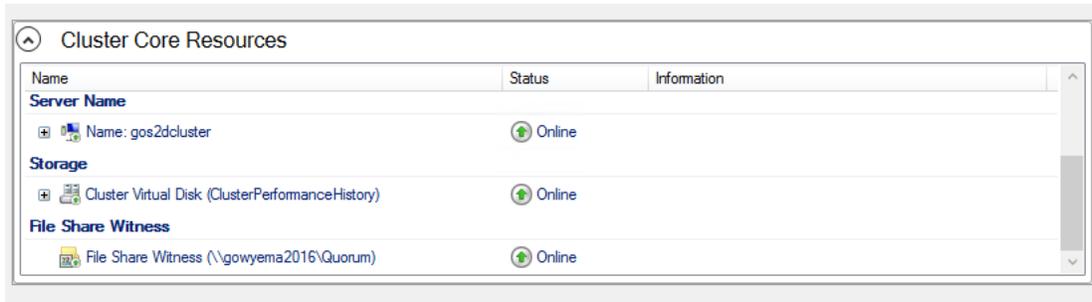
Add with credentials

Add

Cancel

You can see new cluster info on the tool.

You can see the status regarding witness on Failover cluster tool as below.



The screenshot shows the 'Cluster Core Resources' window in the Failover Cluster Manager. It displays a table with columns for Name, Status, and Information. The resources listed are:

Name	Status	Information
Server Name		
Name: gos2dcluster	Online	
Storage		
Cluster Virtual Disk (ClusterPerformanceHistory)	Online	
File Share Witness		
File Share Witness (\gowyema2016\Quorum)	Online	

Storage Spaces Direct (S2D)

Please check the current status with below Power shell command.

Get-ClusterS2D

If you enable it during making a new cluster, S2D is enabled as below.

 Administrator: Windows PowerShell

```
PS C:\ClusterStorage\Collect\control> Get-ClusterS2D

CacheMetadataReserveBytes : 34359738368
CacheModeHDD               : ReadWrite
CacheModeSSD               : WriteOnly
CachePageSizeKBytes       : 16
CacheState                  : Enabled
Name                       : gos2dcluster2
ScmUse                      : Cache
State                       : Enabled

PS C:\ClusterStorage\Collect\control> █
```

If the result as below, you can configure it with these steps.

➤ Administrator: Windows PowerShell

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

PS C:\Windows\system32> get-clusters2d

CacheMetadataReserveBytes : 34359738368
CacheModeHDD               : ReadWrite
CacheModeSSD               : WriteOnly
CachePageSizeKBytes        : 16
CacheState                  : Enabled
Name                        : gos2dcluster6
ScmUse                      : Cache
State                       : Disabled

PS C:\Windows\system32>
```

Please check whether your disks are available or not with Get-Physicaldisk on Powershell. You can see all disks on cluster as below.

```
PS C:\Windows\system32> Get-PhysicalDisk
```

Number	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy	Auto-Select	894.22 GB
6	ATA Micron_5210_MTFD	1940242A9B7E	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC1D.	SSD	False	Lost Communication	Warning	Journal	2.91 TB
1	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FBE6.	SSD	False	Lost Communication	Warning	Journal	2.91 TB
3	ATA Micron_5210_MTFD	1940242A9AC9	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
4	ATA Micron_5210_MTFD	1940242A9AAB	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
	ATA Micron_5300_MTFD	1939251704C2	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB
0	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC0E.	SSD	False	Lost Communication	Warning	Journal	2.91 TB
	ATA Micron_5300_MTFD	1939251704A6	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB
	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC6D.	SSD	False	Lost Communication	Warning	Journal	2.91 TB
	ATA Micron_5300_MTFD	1939251704B3	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB
5	ATA Micron_5210_MTFD	1940242A9B8C	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
	ATA Micron_5300_MTFD	193925170476	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB

```
PS C:\Windows\system32>
```

Note: When you check it with the command before making cluster. You can see DAS only.

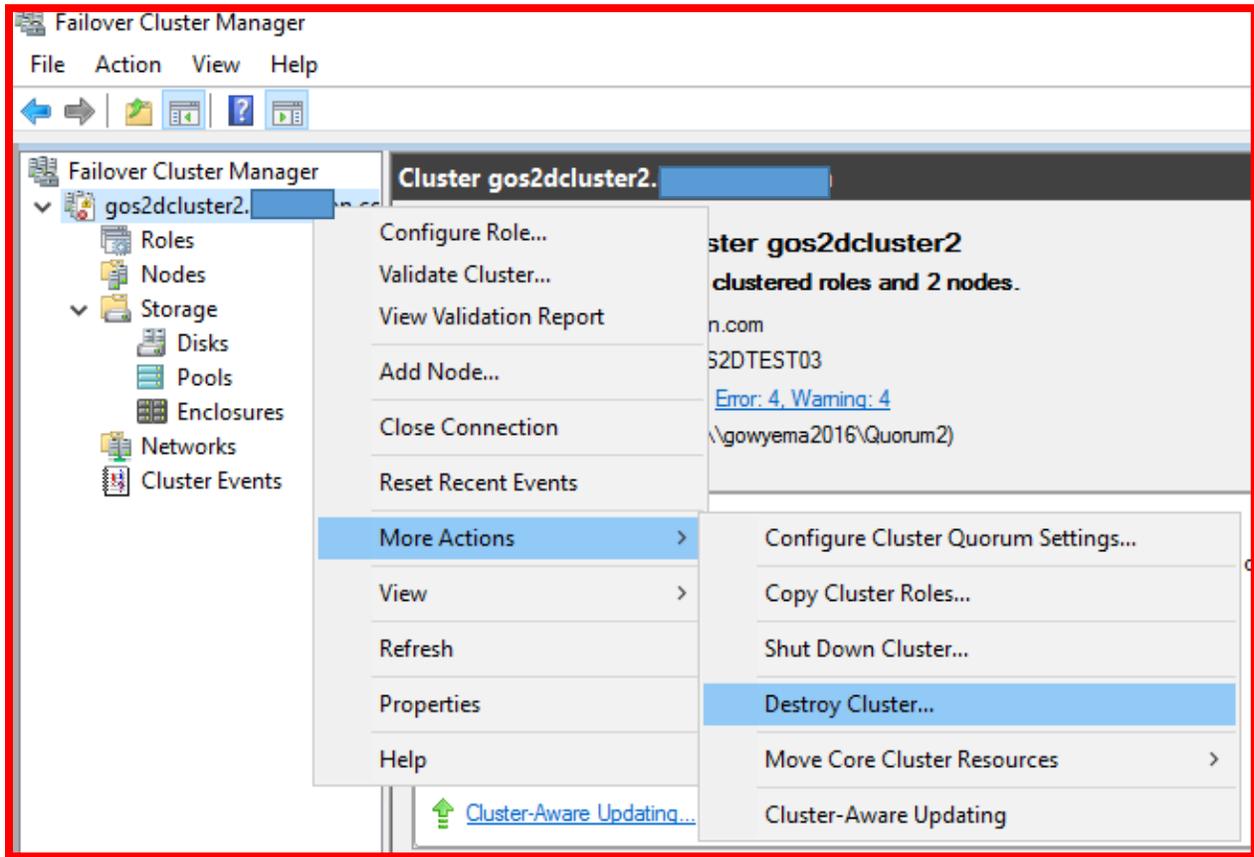
```
PS C:\Users\ad-yema> Get-PhysicalDisk
```

DeviceId	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
6	ATA Micron_5300_MTFD	1939251704CE	SSD	True	OK	Healthy	Auto-Select	3.49 TB
1	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FBE6.	SSD	True	OK	Healthy	Auto-Select	2.91 TB
3	ATA Micron_5300_MTFD	1939251704C4	SSD	True	OK	Healthy	Auto-Select	3.49 TB
4	ATA Micron_5300_MTFD	19392517049F	SSD	True	OK	Healthy	Auto-Select	3.49 TB
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy	Auto-Select	894.22 GB
0	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC0E.	SSD	True	OK	Healthy	Auto-Select	2.91 TB
5	ATA Micron_5300_MTFD	1939251704CA	SSD	True	OK	Healthy	Auto-Select	3.49 TB

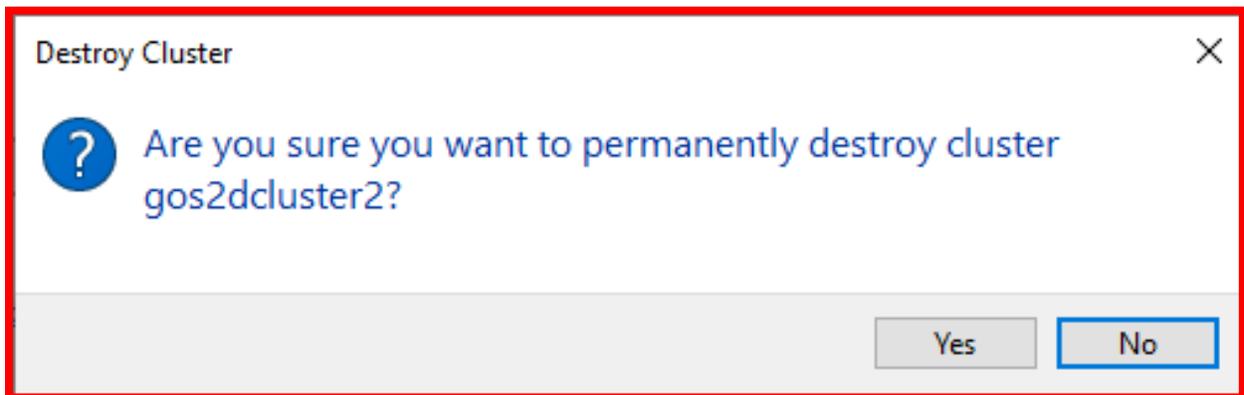
```
PS C:\Users\ad-yema>
```

Troubleshooting:

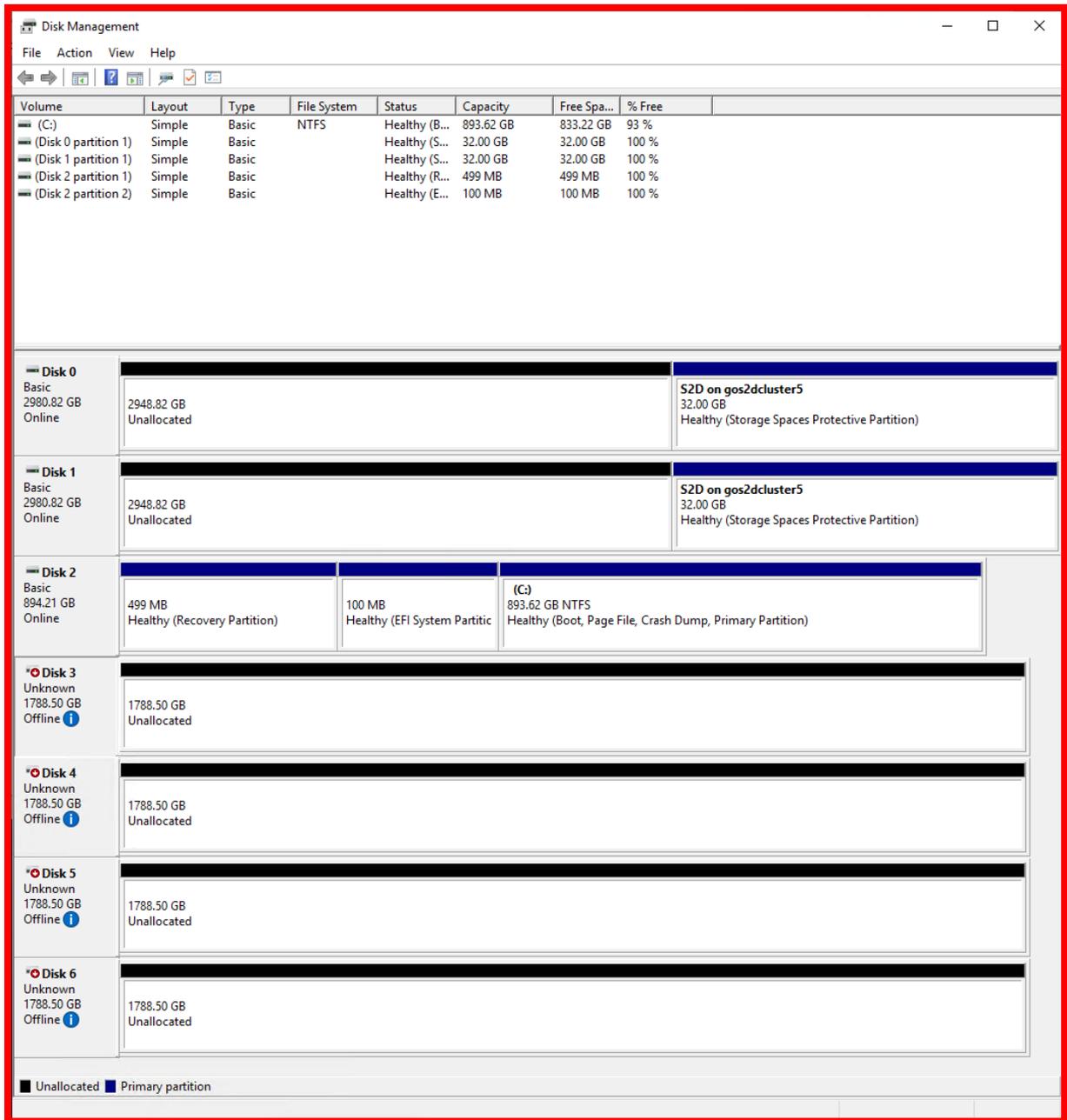
If you cannot see your disks, please delete the cluster you created.



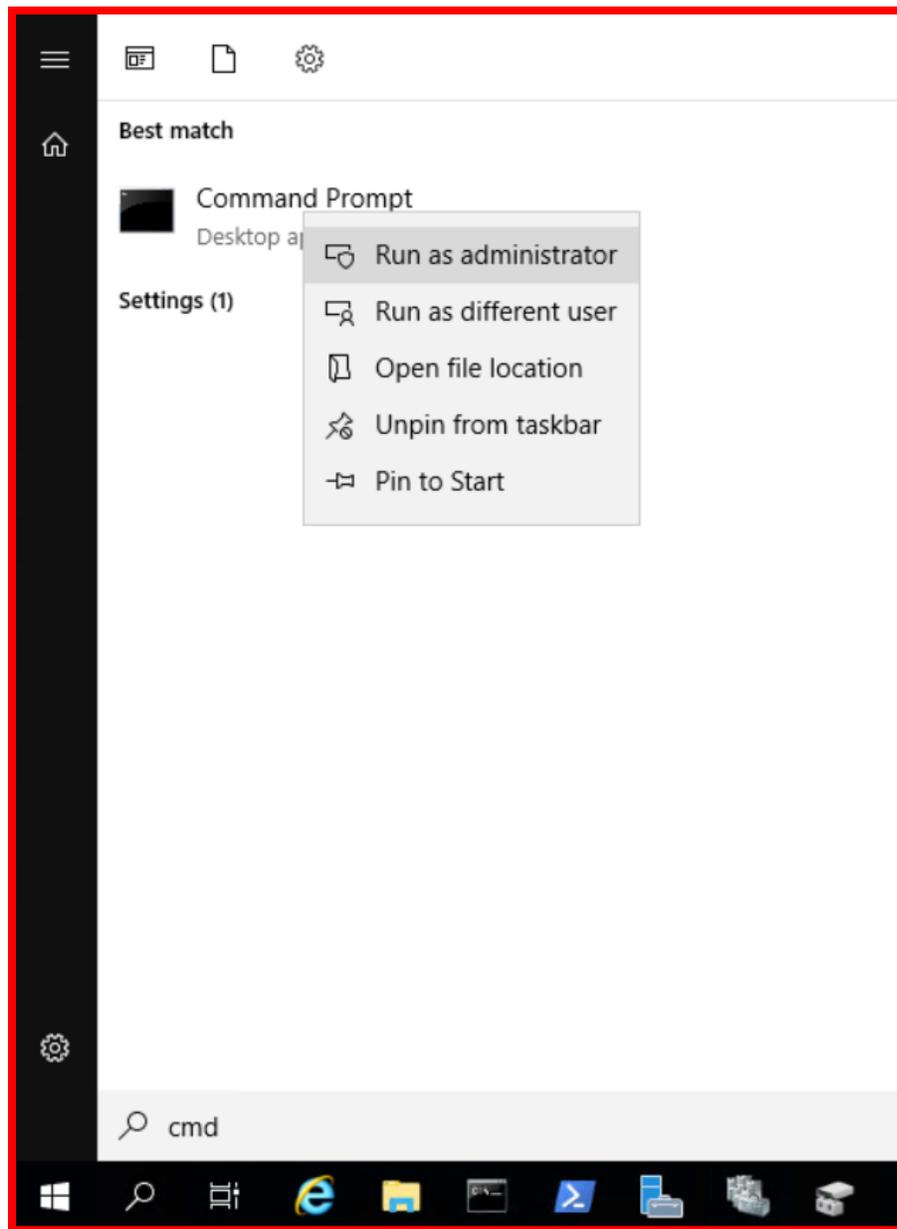
Please click "Yes".



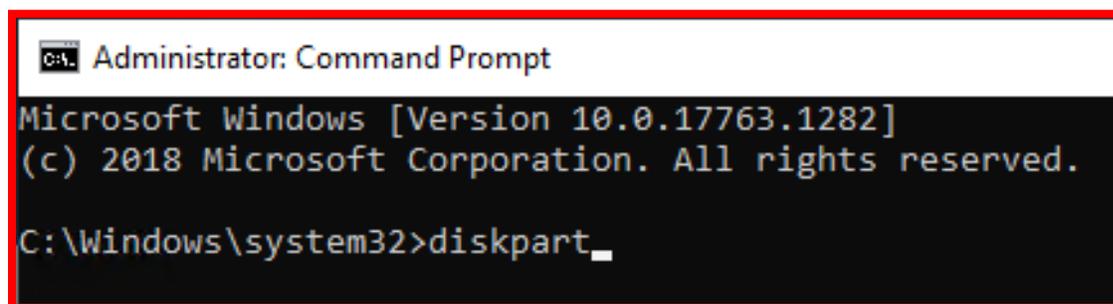
Please check current status on Disk Management. If you re-use NVMe/SSD/HDD from other production servers or clusters, the disk may have previous data as below which you must delete.



Please run “cmd” as administrator mode.



Please run “diskpart”.



Please follow the step.

```
Administrator: Command Prompt - diskpart
Microsoft Windows [Version 10.0.17763.1282]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32>diskpart

Microsoft DiskPart version 10.0.17763.1

Copyright (C) Microsoft Corporation.
On computer: GOWS2DTEST12

DISKPART> list disk

   Disk ###  Status         Size      Free      Dyn  Gpt
   -----  -
   Disk 0    Online         2980 GB   2948 GB           *
   Disk 1    Online         2980 GB   2948 GB           *
   Disk 2    Online          894 GB     0 B            *
   Disk 3    Offline        1788 GB   1788 GB
   Disk 4    Offline        1788 GB   1788 GB
   Disk 5    Offline        1788 GB   1788 GB
   Disk 6    Offline        1788 GB   1788 GB

DISKPART> select disk 0

Disk 0 is now the selected disk.

DISKPART> list partition

   Partition ###  Type              Size      Offset
   -----  -
   Partition 1    Unknown           31 GB    2948 GB

DISKPART> select Partition 1

Partition 1 is now the selected partition.

DISKPART> delete partition override

DiskPart successfully deleted the selected partition.

DISKPART> list partition

There are no partitions on this disk to show.

DISKPART> select disk 1

Disk 1 is now the selected disk.

DISKPART> list partition

   Partition ###  Type              Size      Offset
   -----  -
   Partition 1    Unknown           31 GB    2948 GB

DISKPART> select Partition 1

Partition 1 is now the selected partition.

DISKPART> delete partition override

DiskPart successfully deleted the selected partition.

DISKPART> list partition

There are no partitions on this disk to show.
```

When you clean them up, you can see all disks well as below. And you can see normal status with Get-PhysicalDisks on Powershell.

The screenshot shows a Windows Disk Management window and a Command Prompt window. The Command Prompt shows the execution of the DISKPART utility to clean up disks 0, 1, and 2. Disk 0 and 1 are 2980.82 GB disks, and Disk 2 is an 894.21 GB disk. The Disk Management window shows the resulting state: Disk 0 and 1 are now completely unallocated, while Disk 2 contains its original partitions: a 499 MB Recovery Partition, a 100 MB EFI System Partition, and an 893.62 GB NTFS partition (C:).

The screenshot shows a Windows PowerShell window with the output of the `Get-PhysicalDisk` command. It lists physical disks with their friendly names, serial numbers, media types, and operational statuses. The output is as follows:

Number	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy	Auto-Select	894.22 GB
6	ATA Micron_5210_MTFD	1940242A987E	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
2	Micron_9300_MTFDHAL3T2TDR	0000_0000_0000_0001_00A0_7501_251F_FC1D	SSD	False	Lost Communication	Warning	Journal	2.91 TB
1	Micron_9300_MTFDHAL3T2TDR	0000_0000_0000_0001_00A0_7501_251F_FBE6	SSD	False	Lost Communication	Warning	Journal	2.91 TB
3	ATA Micron_5210_MTFD	1940242A9AC9	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
4	ATA Micron_5210_MTFD	1940242A9AAB	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
0	ATA Micron_5300_MTFD	1939251704C2	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB
0	Micron_9300_MTFDHAL3T2TDR	0000_0000_0000_0001_00A0_7501_251F_FC0E	SSD	False	Lost Communication	Warning	Journal	2.91 TB
0	ATA Micron_5300_MTFD	1939251704A6	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB
0	Micron_9300_MTFDHAL3T2TDR	0000_0000_0000_0001_00A0_7501_251F_FC6D	SSD	False	Lost Communication	Warning	Journal	2.91 TB
0	ATA Micron_5300_MTFD	1939251704B3	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB
5	ATA Micron_5210_MTFD	1940242A98BC	SSD	False	{Transient Error, Lost Communication}	Unhealthy	Auto-Select	3.49 TB
5	ATA Micron_5300_MTFD	193925170476	SSD	False	{Lost Communication, Transient Error}	Unhealthy	Auto-Select	3.49 TB

Number	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
1	Micron_9300_MTFDHAL3T2TDR	0000_0000_0000_0001_00A0_7501_251F_FBE6	SSD	True	OK	Healthy	Auto-Select	2.91 TB
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy	Auto-Select	894.22 GB
0	Micron_9300_MTFDHAL3T2TDR	0000_0000_0000_0001_00A0_7501_251F_FC0E	SSD	True	OK	Healthy	Auto-Select	2.91 TB
3	ATA Micron_5210_MTFD	1940242A987E	SSD	True	OK	Healthy	Auto-Select	1.75 TB
6	ATA Micron_5210_MTFD	1940242A9AC9	SSD	True	OK	Healthy	Auto-Select	1.75 TB
4	ATA Micron_5210_MTFD	1940242A9AAB	SSD	True	OK	Healthy	Auto-Select	1.75 TB
6	ATA Micron_5210_MTFD	1940242A984D	SSD	True	OK	Healthy	Auto-Select	1.75 TB
3	ATA Micron_5210_MTFD	1940242A9C23	SSD	True	OK	Healthy	Auto-Select	1.75 TB
5	ATA Micron_5210_MTFD	1940242A9AE1	SSD	True	OK	Healthy	Auto-Select	1.75 TB
5	ATA Micron_5210_MTFD	1940242A98BC	SSD	True	OK	Healthy	Auto-Select	1.75 TB
4	ATA Micron_5210_MTFD	1940242A9BA7	SSD	True	OK	Healthy	Auto-Select	1.75 TB

```

Administrator: Windows PowerShell
PS C:\Windows\system32> Get-PhysicalDisk

Number FriendlyName          SerialNumber          MediaType CanPool OperationalStatus HealthStatus Usage      Size
-----
1 Micron_9300_MTFDHAL3T2DR 0000_0000_0000_0001_00A0_7501_251F_FC1D. SSD      True      OK              Healthy      Auto-Select 2.91 TB
2 HPE LOGICAL VOLUME      PF7HD0ARC60V5        SSD      False     OK              Healthy      Auto-Select 894.22 GB
0 Micron_9300_MTFDHAL3T2DR 0000_0000_0000_0001_00A0_7501_251F_FC6D. SSD      True      OK              Healthy      Auto-Select 2.91 TB
6 ATA Micron_5210_MTFD     1940242A9B7E         SSD      True      OK              Healthy      Auto-Select 1.75 TB
3 ATA Micron_5210_MTFD     1940242A9AC9         SSD      True      OK              Healthy      Auto-Select 1.75 TB
4 ATA Micron_5210_MTFD     1940242A9AAB         SSD      True      OK              Healthy      Auto-Select 1.75 TB
6 ATA Micron_5210_MTFD     1940242A9B4D         SSD      True      OK              Healthy      Auto-Select 1.75 TB
3 ATA Micron_5210_MTFD     1940242A9C23         SSD      True      OK              Healthy      Auto-Select 1.75 TB
5 ATA Micron_5210_MTFD     1940242A9AE1         SSD      True      OK              Healthy      Auto-Select 1.75 TB
5 ATA Micron_5210_MTFD     1940242A9BBC         SSD      True      OK              Healthy      Auto-Select 1.75 TB
4 ATA Micron_5210_MTFD     1940242A9BA7         SSD      True      OK              Healthy      Auto-Select 1.75 TB

PS C:\Windows\system32>

```

If you have seen this situation several times, please try to create cluster with below command.

```
New-Cluster -name CLUSTER NAME -node NODE1,NODE2 -NoStorage -StaticAddress 192.168.xxx.xxx
```

Example:

Cluster name : S2DTEST

NODE1: WINS2DTEST01 [server host name]

NODE2: WINS2DTEST02 [server host name]

Static IP address : 192.168.1.111

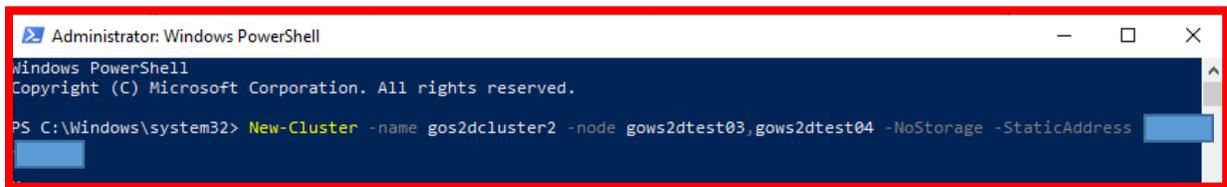
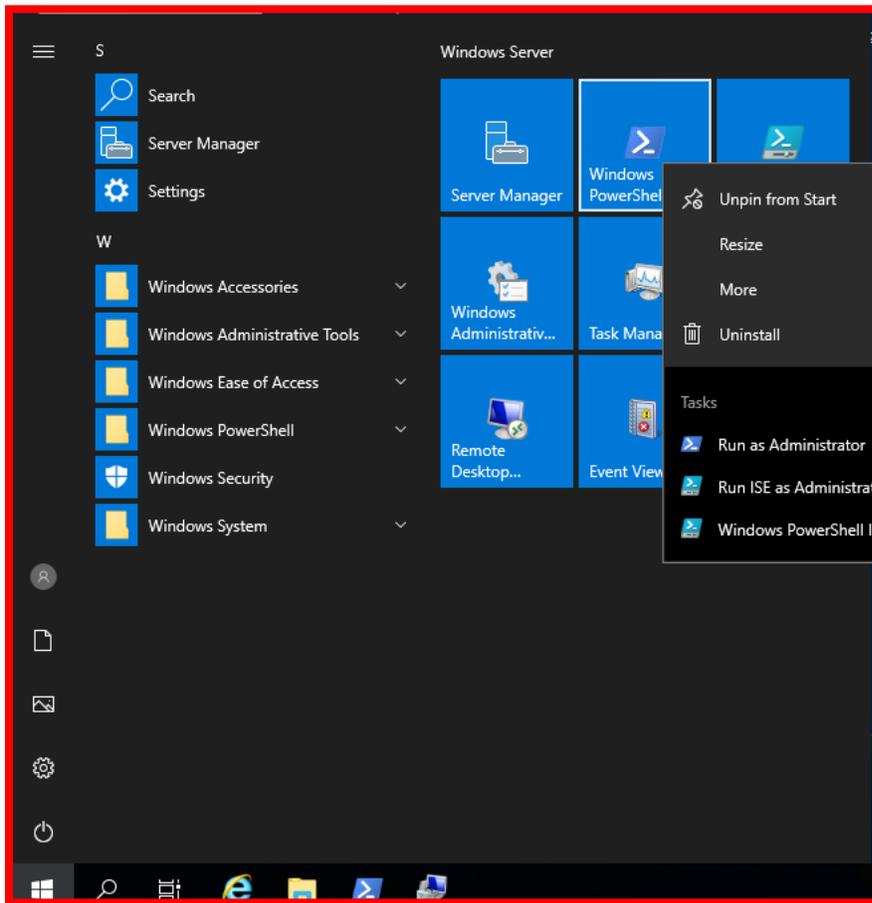
```
New-Cluster -name S2DTEST -node WINS2DTEST01, WINS2DTEST02 -NoStorage -StaticAddress 192.168.1.111
```

Please refer below example also.

New-Cluster -name gos2dcluster2 -node gows2dtest03, gows2dtest04 -NoStorage -
StaticAddress [REDACTED]

-NoStorage option is important.

Please run the above command with Administrator mode on Power shell as below.



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

New-Cluster
  Forming cluster 'gos2dcluster2'.
  [ ]
```

You could create it well.

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

PS C:\Windows\system32> New-Cluster -name gos2dcluster2 -node gows2dtest03,gows2dtest04 -NoStorage -StaticAddress [redacted]

Name
----
gos2dcluster2

PS C:\Windows\system32>
```

You can see all disks as below.

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

PS C:\Windows\system32> New-Cluster -name gos2dcluster2 -node gows2dtest03,gows2dtest04 -NoStorage -StaticAddress [redacted]

Name
----
gos2dcluster2

PS C:\Windows\system32> get-physicaldisk

DeviceId FriendlyName          SerialNumber          MediaType CanPool OperationalStatus HealthS
-----
1         Micron_9300_MTFDHAL3T2DR 0000_0000_0000_0001_00A0_7501_251F_FBE6. SSD      True    OK              Healthy
2         HPE LOGICAL VOLUME      PFJHD0ARCC60VP      SSD      False   OK              Healthy
0         Micron_9300_MTFDHAL3T2DR 0000_0000_0000_0001_00A0_7501_251F_FC0E. SSD      True    OK              Healthy
6         ATA Micron_5300_MTFD     1939251704CE        SSD      True    OK              Healthy
3         ATA Micron_5300_MTFD     1939251704C4        SSD      True    OK              Healthy
4         ATA Micron_5300_MTFD     19392517049F        SSD      True    OK              Healthy
6         ATA Micron_5300_MTFD     1939251704C2        SSD      True    OK              Healthy
3         ATA Micron_5300_MTFD     1939251704A6        SSD      True    OK              Healthy
5         ATA Micron_5300_MTFD     193925170483        SSD      True    OK              Healthy
5         ATA Micron_5300_MTFD     1939251704CA        SSD      True    OK              Healthy
4         ATA Micron_5300_MTFD     193925170476        SSD      True    OK              Healthy

PS C:\Windows\system32>
```

Please enable Storage Spaces Direct with below command. The powerful command will recognize your disk well. and it configure cache tier and capacity tier well.

 Administrator: Windows PowerShell

```
PS C:\Windows\system32> Enable-ClusterStorageSpacesDirect -Verbose
```

Please select “[A] Yes to All”.

```
Administrator: Windows PowerShell
PS C:\Windows\system32> Enable-ClusterStorageSpacesDirect -Verbose
VERBOSE: 2020/01/23-04:20:50.010 Ensuring that all nodes support S2D
VERBOSE: 2020/01/23-04:20:50.016 Querying storage information
VERBOSE: 2020/01/23-04:20:50.381 Sorted disk types present (fast to slow): NVMe,SSD. Number of types present: 2
VERBOSE: 2020/01/23-04:20:50.381 Checking that nodes support the desired cache state
VERBOSE: 2020/01/23-04:20:50.386 Checking that all disks support the desired cache state

Confirm
Are you sure you want to perform this action?
Performing operation 'Enable Cluster Storage Spaces Direct' on Target 'gos2dcluster2'.
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): A
```

The process will be completed in 5 mins.

```
Administrator: Windows PowerShell
PS C:\Windows\system32> Enable-ClusterStorageSpacesDirect -Verbose
VERBOSE: 2020/01/23-04:20:50.010 Ensuring that all nodes support S2D

Enable-ClusterStorageSpacesDirect -Verbose
0/1 completed
[
  Enabling cluster Storage Spaces Direct
  Waiting until physical disks are claimed
  [ooooooooooooooooooooo
  15% Complete

VERBOSE: 2020/01/23-04:22:03.181 Setting cluster property
VERBOSE: 2020/01/23-04:22:03.181 Setting default fault domain awareness on clustered storage subsystem
VERBOSE: 2020/01/23-04:22:03.251 Waiting until physical disks are claimed
VERBOSE: 2020/01/23-04:22:06.259 Number of claimed disks on node 'GOWS2DTEST03': 0/6
```

You can check the result with log file. Please check

<file:///C:/Windows/Cluster/Reports/EnableClusterS2D>.

```
Administrator: Windows PowerShell
PS C:\Windows\system32> Enable-ClusterStorageSpacesDirect -Verbose
VERBOSE: 2020/01/23-04:20:50.010 Ensuring that all nodes support S2D
VERBOSE: 2020/01/23-04:20:50.016 Querying storage information
VERBOSE: 2020/01/23-04:20:50.381 Sorted disk types present (fast to slow): NVMe,SSD. Number of types present: 2
VERBOSE: 2020/01/23-04:20:50.381 Checking that nodes support the desired cache state
VERBOSE: 2020/01/23-04:20:50.386 Checking that all disks support the desired cache state

Confirm
Are you sure you want to perform this action?
Performing operation 'Enable Cluster Storage Spaces Direct' on Target 'gos2dcluster2'.
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): A
VERBOSE: 2020/01/23-04:22:02.816 Creating health resource
VERBOSE: 2020/01/23-04:22:03.181 Setting cluster property
VERBOSE: 2020/01/23-04:22:03.181 Setting default fault domain awareness on clustered storage subsystem
VERBOSE: 2020/01/23-04:22:03.251 Waiting until physical disks are claimed
VERBOSE: 2020/01/23-04:22:06.259 Number of claimed disks on node 'GOWS2DTEST03': 0/6
VERBOSE: 2020/01/23-04:22:09.267 Number of claimed disks on node 'GOWS2DTEST04': 0/6
VERBOSE: 2020/01/23-04:22:12.274 Number of claimed disks on node 'GOWS2DTEST03': 2/6
VERBOSE: 2020/01/23-04:22:15.282 Number of claimed disks on node 'GOWS2DTEST04': 6/6
VERBOSE: 2020/01/23-04:22:18.289 Number of claimed disks on node 'GOWS2DTEST03': 6/6
VERBOSE: 2020/01/23-04:22:18.294 Node 'GOWS2DTEST03': Waiting until cache reaches desired state (HDD:'ReadWrite'
SSD:'WriteOnly')
VERBOSE: 2020/01/23-04:22:18.296 SBL disks initialized in cache on node 'GOWS2DTEST03': 6 (6 on all nodes)
VERBOSE: 2020/01/23-04:22:18.299 Cache reached desired state on GOWS2DTEST03
VERBOSE: 2020/01/23-04:22:19.300 Node 'GOWS2DTEST04': Waiting until cache reaches desired state (HDD:'ReadWrite'
SSD:'WriteOnly')
VERBOSE: 2020/01/23-04:22:19.303 SBL disks initialized in cache on node 'GOWS2DTEST04': 6 (12 on all nodes)
VERBOSE: 2020/01/23-04:22:19.306 Cache reached desired state on GOWS2DTEST04
VERBOSE: 2020/01/23-04:22:20.307 Waiting until SBL disks are surfaced
VERBOSE: 2020/01/23-04:22:23.321 Disks surfaced on node 'GOWS2DTEST03': 12/12
VERBOSE: 2020/01/23-04:22:23.334 Disks surfaced on node 'GOWS2DTEST04': 12/12
VERBOSE: 2020/01/23-04:22:26.645 Waiting until all physical disks are reported by clustered storage subsystem
VERBOSE: 2020/01/23-04:22:29.839 Physical disks in clustered storage subsystem: 12
VERBOSE: 2020/01/23-04:22:29.839 Querying pool information
VERBOSE: 2020/01/23-04:22:30.083 Starting health providers
VERBOSE: 2020/01/23-04:22:37.455 Checking that all disks support the desired cache state
VERBOSE: 2020/01/23-04:22:37.481 Required steps for this action completed successfully

Node          EnableReportName
----          -
GOWS2DTEST03 C:\Windows\Cluster\Reports\EnableClusterS2D on 2020.01.23-04.22.37.htm

PS C:\Windows\system32>
```



EnableClusterS2D

ClusterName: gos2cluster2
Started: 2020/01/23-04:20:49
Completed: 2020/01/23-04:22:37

2020/01/23-04:20:50.010 Ensuring that all nodes support S2D.
 2020/01/23-04:20:50.016 Querying storage information.
 2020/01/23-04:20:50.381 Sorted disk types present (fast to slow): NVMe,SSD. Number of types present: 2.
 2020/01/23-04:20:50.381 Checking that nodes support the desired cache state.
 2020/01/23-04:20:50.386 Checking that all disks support the desired cache state.
 2020/01/23-04:22:02.816 Creating health resource.
 2020/01/23-04:22:03.181 Setting cluster property.
 2020/01/23-04:22:03.181 Setting default fault domain awareness on clustered storage subsystem.
 2020/01/23-04:22:03.251 Waiting until physical disks are claimed.
 2020/01/23-04:22:06.259 Number of claimed disks on node 'GOWS2DTEST03': 0/6.
 2020/01/23-04:22:09.267 Number of claimed disks on node 'GOWS2DTEST04': 0/6.
 2020/01/23-04:22:12.274 Number of claimed disks on node 'GOWS2DTEST03': 2/6.
 2020/01/23-04:22:15.282 Number of claimed disks on node 'GOWS2DTEST04': 6/6.
 2020/01/23-04:22:18.289 Number of claimed disks on node 'GOWS2DTEST03': 6/6.
 2020/01/23-04:22:18.294 Node 'GOWS2DTEST03': Waiting until cache reaches desired state (HDD:ReadWrite SSD:WriteOnly).
 2020/01/23-04:22:18.296 SBL disks initialized in cache on node 'GOWS2DTEST03': 6 (6 on all nodes).
 2020/01/23-04:22:18.299 Cache reached desired state on GOWS2DTEST03.
 2020/01/23-04:22:19.300 Node 'GOWS2DTEST04': Waiting until cache reaches desired state (HDD:ReadWrite SSD:WriteOnly).
 2020/01/23-04:22:19.303 SBL disks initialized in cache on node 'GOWS2DTEST04': 6 (12 on all nodes).
 2020/01/23-04:22:19.306 Cache reached desired state on GOWS2DTEST04.
 2020/01/23-04:22:20.307 Waiting until SBL disks are surfaced.
 2020/01/23-04:22:23.321 Disks surfaced on node 'GOWS2DTEST03': 12/12.
 2020/01/23-04:22:23.334 Disks surfaced on node 'GOWS2DTEST04': 12/12.
 2020/01/23-04:22:26.645 Waiting until all physical disks are reported by clustered storage subsystem.
 2020/01/23-04:22:29.839 Physical disks in clustered storage subsystem: 12.
 2020/01/23-04:22:29.839 Querying pool information.
 2020/01/23-04:22:30.083 Starting health providers.
 2020/01/23-04:22:37.455 Checking that all disks support the desired cache state.
 2020/01/23-04:22:37.481 Required steps for this action completed successfully.

Disks claimed summary

Node	Friendly Name	Count
GOWS2DTEST03	Micron_9300_MTFDHAL3T2TDR	2
GOWS2DTEST03	ATA Micron_5300_MTFD	4
GOWS2DTEST04	Micron_9300_MTFDHAL3T2TDR	2
GOWS2DTEST04	ATA Micron_5300_MTFD	4

Disks claimed

Node	Disk	Friendly Name	Disks used for cache
GOWS2DTEST03	28cca1f6-5162-ade5-739d-bc61f3302f19	Micron_9300_MTFDHAL3T2TDR	True
GOWS2DTEST03	83fe6816-2592-f42d-ca43-3fb546149401	Micron_9300_MTFDHAL3T2TDR	True
GOWS2DTEST03	120d983f-4f2b-ee61-053b-e1e8b40c7f8d	ATA Micron_5300_MTFD	False
GOWS2DTEST03	45492849-188f-092f-e436-28104bd951aa	ATA Micron_5300_MTFD	False
GOWS2DTEST03	49d9efaf-53e6-3313-c8af-f119de407e3c	ATA Micron_5300_MTFD	False
GOWS2DTEST03	d3a21f93-7916-95b5-0168-405a67d566e4	ATA Micron_5300_MTFD	False
GOWS2DTEST04	1db08e07-2e31-2de2-517b-ccdec239f05ab	Micron_9300_MTFDHAL3T2TDR	True
GOWS2DTEST04	90f9d448-4d24-e502-d4d9-6fd5997797d4	Micron_9300_MTFDHAL3T2TDR	True
GOWS2DTEST04	59efe28c-0861-f4d4-d772-e2be20c947f1	ATA Micron_5300_MTFD	False
GOWS2DTEST04	8e3c5dc8-051d-0e40-a116-7b533bd82cef	ATA Micron_5300_MTFD	False
GOWS2DTEST04	batffbo2-6582-5194-1486-5d1999422397	ATA Micron_5300_MTFD	False
GOWS2DTEST04	dc35b5bd-00db-0fdd-a36e-0e1c76bdad10	ATA Micron_5300_MTFD	False

Disks not claimed summary

All disks were claimed

When you check disk status again. You will see “False” in CanPool category. These disks are used as S2D. so it cannot use for other purpose now.

```
PS C:\Windows\system32> get-physicaldisk
```

DeviceId	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy
1006	ATA Micron_5300_MTFD	1939251704CE	SSD	False	OK	Healthy
2001	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC1D.	SSD	False	OK	Healthy
1001	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FBE6.	SSD	False	OK	Healthy
1003	ATA Micron_5300_MTFD	1939251704C4	SSD	False	OK	Healthy
1004	ATA Micron_5300_MTFD	19392517049F	SSD	False	OK	Healthy
2006	ATA Micron_5300_MTFD	1939251704C2	SSD	False	OK	Healthy
1000	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC0E.	SSD	False	OK	Healthy
2003	ATA Micron_5300_MTFD	1939251704A6	SSD	False	OK	Healthy
2000	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC6D.	SSD	False	OK	Healthy
2005	ATA Micron_5300_MTFD	193925170483	SSD	False	OK	Healthy
1005	ATA Micron_5300_MTFD	1939251704CA	SSD	False	OK	Healthy
2004	ATA Micron_5300_MTFD	193925170476	SSD	False	OK	Healthy

```
PS C:\Windows\system32>
```

You can see the category is changed to False from True as below.

```
Administrator: Windows PowerShell
PS C:\Windows\system32> Get-PhysicalDisk
```

Number	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
1	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FBE6.	SSD	True	OK	Healthy	Auto-Select	2.91 TB
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy	Auto-Select	894.22 GB
0	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC0E.	SSD	True	OK	Healthy	Auto-Select	2.91 TB
6	ATA Micron_5210_MTFD	1940242A9B7E	SSD	True	OK	Healthy	Auto-Select	1.75 TB
3	ATA Micron_5210_MTFD	1940242A9AC9	SSD	True	OK	Healthy	Auto-Select	1.75 TB
4	ATA Micron_5210_MTFD	1940242A9AAB	SSD	True	OK	Healthy	Auto-Select	1.75 TB
6	ATA Micron_5210_MTFD	1940242A9B4D	SSD	True	OK	Healthy	Auto-Select	1.75 TB
3	ATA Micron_5210_MTFD	1940242A9C23	SSD	True	OK	Healthy	Auto-Select	1.75 TB
5	ATA Micron_5210_MTFD	1940242A9AE1	SSD	True	OK	Healthy	Auto-Select	1.75 TB
5	ATA Micron_5210_MTFD	1940242A9B8C	SSD	True	OK	Healthy	Auto-Select	1.75 TB
4	ATA Micron_5210_MTFD	1940242A9BA7	SSD	True	OK	Healthy	Auto-Select	1.75 TB

```
PS C:\Windows\system32> Enable-ClusterStorageSpacesDirect -Verbose
VERBOSE: 2020/07/01-02:47:45.700 Ensuring that all nodes support S2D
VERBOSE: 2020/07/01-02:47:45.704 Querying storage information
VERBOSE: 2020/07/01-02:47:46.081 Sorted disk types present (fast to slow): NVMe,SSD. Number of types present: 2
VERBOSE: 2020/07/01-02:47:46.082 Checking that nodes support the desired cache state
VERBOSE: 2020/07/01-02:47:46.087 Checking that all disks support the desired cache state

Confirm
Are you sure you want to perform this action?
Performing operation 'Enable Cluster Storage Spaces Direct' on Target 'gos2dcluster6'.
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): A
VERBOSE: 2020/07/01-02:47:52.816 Creating health resource
VERBOSE: 2020/07/01-02:47:53.160 Setting cluster property
VERBOSE: 2020/07/01-02:47:53.160 Setting default fault domain awareness on clustered storage subsystem
VERBOSE: 2020/07/01-02:47:53.210 Waiting until physical disks are claimed
VERBOSE: 2020/07/01-02:47:56.218 Number of claimed disks on node 'GOWS2DTEST11': 0/6
VERBOSE: 2020/07/01-02:47:59.226 Number of claimed disks on node 'GOWS2DTEST12': 0/6
VERBOSE: 2020/07/01-02:48:02.234 Number of claimed disks on node 'GOWS2DTEST11': 2/6
VERBOSE: 2020/07/01-02:48:05.242 Number of claimed disks on node 'GOWS2DTEST12': 6/6
VERBOSE: 2020/07/01-02:48:08.250 Number of claimed disks on node 'GOWS2DTEST11': 6/6
VERBOSE: 2020/07/01-02:48:08.255 Node 'GOWS2DTEST11': Waiting until cache reaches desired state (HDD:'ReadWrite' SSD:'WriteOnly')
VERBOSE: 2020/07/01-02:48:08.258 SBL disks initialized in cache on node 'GOWS2DTEST11': 6 (6 on all nodes)
VERBOSE: 2020/07/01-02:48:08.261 Cache reached desired state on GOWS2DTEST11
VERBOSE: 2020/07/01-02:48:09.262 Node 'GOWS2DTEST12': Waiting until cache reaches desired state (HDD:'ReadWrite' SSD:'WriteOnly')
VERBOSE: 2020/07/01-02:48:09.265 SBL disks initialized in cache on node 'GOWS2DTEST12': 6 (12 on all nodes)
VERBOSE: 2020/07/01-02:48:09.268 Cache reached desired state on GOWS2DTEST12
VERBOSE: 2020/07/01-02:48:10.269 Waiting until SBL disks are surfaced
VERBOSE: 2020/07/01-02:48:13.283 Disks surfaced on node 'GOWS2DTEST11': 12/12
VERBOSE: 2020/07/01-02:48:13.296 Disks surfaced on node 'GOWS2DTEST12': 12/12
VERBOSE: 2020/07/01-02:48:16.603 Waiting until all physical disks are reported by clustered storage subsystem
VERBOSE: 2020/07/01-02:48:19.787 Physical disks in clustered storage subsystem: 12
VERBOSE: 2020/07/01-02:48:19.788 Querying pool information
VERBOSE: 2020/07/01-02:48:20.034 Starting health providers
VERBOSE: 2020/07/01-02:48:27.410 Checking that all disks support the desired cache state
VERBOSE: 2020/07/01-02:48:27.437 Required steps for this action completed successfully

Node      EnableReportName
-----
GOWS2DTEST11 C:\Windows\Cluster\Reports\EnableClusterS2D on 2020.07.01-02.48.27.htm

PS C:\Windows\system32> Get-PhysicalDisk
```

Number	FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
2	HPE LOGICAL VOLUME	PFJHD0ARCC60VP	SSD	False	OK	Healthy	Auto-Select	894.22 GB
1006	ATA Micron_5210_MTFD	1940242A9B7E	SSD	False	OK	Healthy	Auto-Select	1.75 TB
2001	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC1D.	SSD	False	OK	Healthy	Journal	2.91 TB
1001	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FBE6.	SSD	False	OK	Healthy	Journal	2.91 TB
1003	ATA Micron_5210_MTFD	1940242A9AC9	SSD	False	OK	Healthy	Auto-Select	1.75 TB
1004	ATA Micron_5210_MTFD	1940242A9AAB	SSD	False	OK	Healthy	Auto-Select	1.75 TB
2006	ATA Micron_5210_MTFD	1940242A9B4D	SSD	False	OK	Healthy	Auto-Select	1.75 TB
1000	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC0E.	SSD	False	OK	Healthy	Journal	2.91 TB
2003	ATA Micron_5210_MTFD	1940242A9C23	SSD	False	OK	Healthy	Auto-Select	1.75 TB
2000	Micron_9300_MTFDHAL3T2DR	0000_0000_0000_0001_00A0_7501_251F_FC6D.	SSD	False	OK	Healthy	Journal	2.91 TB
2005	ATA Micron_5210_MTFD	1940242A9AE1	SSD	False	OK	Healthy	Auto-Select	1.75 TB
1005	ATA Micron_5210_MTFD	1940242A9B8C	SSD	False	OK	Healthy	Auto-Select	1.75 TB
2004	ATA Micron_5210_MTFD	1940242A9BA7	SSD	False	OK	Healthy	Auto-Select	1.75 TB

```
PS C:\Windows\system32>
```

Troubleshooting:

If you cannot see cache tier, the PowerShell command wrong to setup it. Please try to use below command. Auto-Select will be change to Journal. And please check disk inventory on WAC. It should be changed to Cache tier.

```
Get-PhysicalDisk -FriendlyName 'Micron_9300*' | Set-PhysicalDisk -Usage Journal
```

Install Windows Admin Center (WAC)

If you would like to understand WAC, the following poster may be good. You can download it from Microsoft page.

aka.ms/WindowsAdminCenter
Windows Admin Center

Designed for you. Designed WITH YOU.
 To get a sneak peek of new features and help design the future of WAC, join our insiders group at aka.ms/CloudInsiders

Server management reimagined

- Lighting up the platform**
Management UI for new Windows Server 2019 features are available only through Windows Admin Center. Storage Migration Services, System Insights, Software-Defined Networking and more.
- Modern, Simple.**
The tools you know from Server Manager and MMC (Certificate Manager, Task Manager and more) are refreshed and streamlined for your core tasks.
- No extra cost**
Windows Admin Center comes at no extra cost beyond the Windows license.

Complements existing management tools in your environment
 Drill-down to manage a single server or cluster for troubleshooting, configuration and maintenance

- Azure management services**
Complements the built-in cloud monitoring and management capabilities with an on-premises cluster provider for troubleshooting and configuration.
- System Center**
Complements the large-scale monitoring and management capabilities of System Center by providing an easy way to do granular troubleshooting and configuration on a per server or per cluster basis.

CloudHybrid Environments of any size

- Large deployments**
Enterprises, hosters, and service providers
- Small deployments**
Small to medium business, remote/branch office

Lightweight
Small (~60MB) download, install in minutes, no agent installation required on target connections. Access from a modern browser.

Integrated
One consistent interface across tools, and all third connections types including Windows Server, Azure Stack HCI clusters and more.

Constantly Improving
New features added multiple times a year. Let us know what you want next: aka.ms/WACFeedback

RSAT
Continue to use Remote Server Administration Tools for managing server roles and features. You can use Windows Admin Center instead of RSAT to manage clusters, Hyper-V, Active Directory, DNS, DHCP, IS and more.

Remote Desktop
Instead of connecting to a server via RDP and using traditional in-box tools like Server Manager, you can manage servers remotely from a browser using Windows Admin Center.

Core functionality
Single server or cluster troubleshooting, configuration & maintenance

Windows Server

- Overview
- Active Directory
- Apps & Features
- Certificates
- Containers
- Devices
- DHCP
- DNS
- Events
- Files
- Firewall
- IS
- Network
- Remote monitoring
- Performance monitor
- PowerShell
- Processes
- Registry
- Remote Desktop
- Roles & features
- Scheduled tasks
- Security
- Settings
- Storage
- Storage Migration Service
- Storage Replica
- System Insights
- User & groups
- Virtual machines
- Virtual switches
- Windows Update

Cluster

- Overview
- Cluster Aware Updates
- Drives
- Network
- Nodes
- SDN monitoring & configuration
- Servers
- Storage Spaces Direct
- Virtual machines
- Virtual network
- Virtual switches
- Volumes

Hybrid

Extend on-premises capacity

- Azure File Sync
- Cloud Witness
- Create Azure VM
- Azure Extended Network
- Azure Network Adapter
- Storage Migration Service

Business continuity + disaster recovery

- Azure Backup
- Azure Site Recovery
- Storage Replica

Manage from Azure

- Azure Arc For Servers
- Azure Monitor
- Azure Security Center
- Azure Update Management

Azure Stack HCI

Create and manage Storage Spaces Direct and Hyper-V virtual machines
 Reliably simple workflows to create, open, resize, and delete volumes, and create, start, connect to, and move virtual machines and much more.

Powerful cluster-wide monitoring
 Cloud intelligence to monitor and CPU usage, storage capacity, IOPS, throughput, and latency in real-time across every server in the cluster, with clear alerts when something's not right.

Software-Defined Networking (SDN) support
 Manage and monitor virtual networks, address, connect virtual machines to virtual networks, and monitor SDN infrastructure.

Connect to hybrid cloud services
 Streamline access to management, and security services in Azure, such as for recovery, and cloud-based monitoring.

Security
 Leverage existing technologies for multiple layers of security across connection logs to your target.

- Secure access to the Windows Admin Center gateway**
 - Use Azure Active Directory identities to enforce conditional access policies such as multi-factor authentication
 - Restrict gateway access and administration with Active Directory and local groups
 - Browser-based UI uses secure HTTPS communication, even in on-premises environments
- Secure access to servers managed with Windows Admin Center**
 - Connect via WinRM over HTTP or HTTPS
 - Configure Role-Based Access Control (RBAC) on managed nodes
 - Configure delegation for a single sign-on experience
 - Leverage the power of Local Administrator Password Solution (LAPS) when using Windows Admin Center in desktop mode

Partner Ecosystem
 Get additional capabilities for hardware, application management and monitoring through 3rd party extensions right from within Windows Admin Center.

Extensibility with the Windows Admin Center SDK
 Integrate with Windows Admin Center tools. Easy and seamless in Web UI and using deep links.

Design an extension with ease
 Quickly mockup UI before coding using our PowerPoint design toolkit.

Develop with latest web technologies
 HTML5, CSS, Angular, TypeScript, Windows Admin Center UI library.

Leverage platform capabilities
 Azure Active Directory Multi-Factor Authentication, role-based access control, logging/auditing.

Extend product outreach
 Faster growing server management tool in Microsoft history!

Architecture

Access to anywhere
Publish to DNS + open Firewall

Connect via a modern browser
Edge, Chrome

Lightweight footprint
 IS not required
 SDK not required
 AD not required

No agent installation required
 WMP 5.1 required on Windows Server 2012, 2012 R2, 2008 R2

Flexible deployment options

Installs on
 - Windows 10
 - Windows Server (Semi-Annual Channel)
 - Windows Server 2019
 - Windows Server 2016

Manages
 - Windows 10
 - Windows Server (Semi-Annual Channel)
 - Windows Server 2019
 - Windows Server 2016
 - Windows Server 2012 R2
 - Windows Server 2008 R2

Manage multiple environments

Hosters + managed service providers
 Manage multiple customer environments from a web browser.

Manage Windows Server anywhere
 Admins can manage Windows Server instances anywhere: on-premises in Azure, or in any cloud.

https://docs.microsoft.com/ja-jp/windows-server/manage/windows-admin-center/media/wac1910poster_thumb.png

Please download latest MSI file from Microsoft Page.

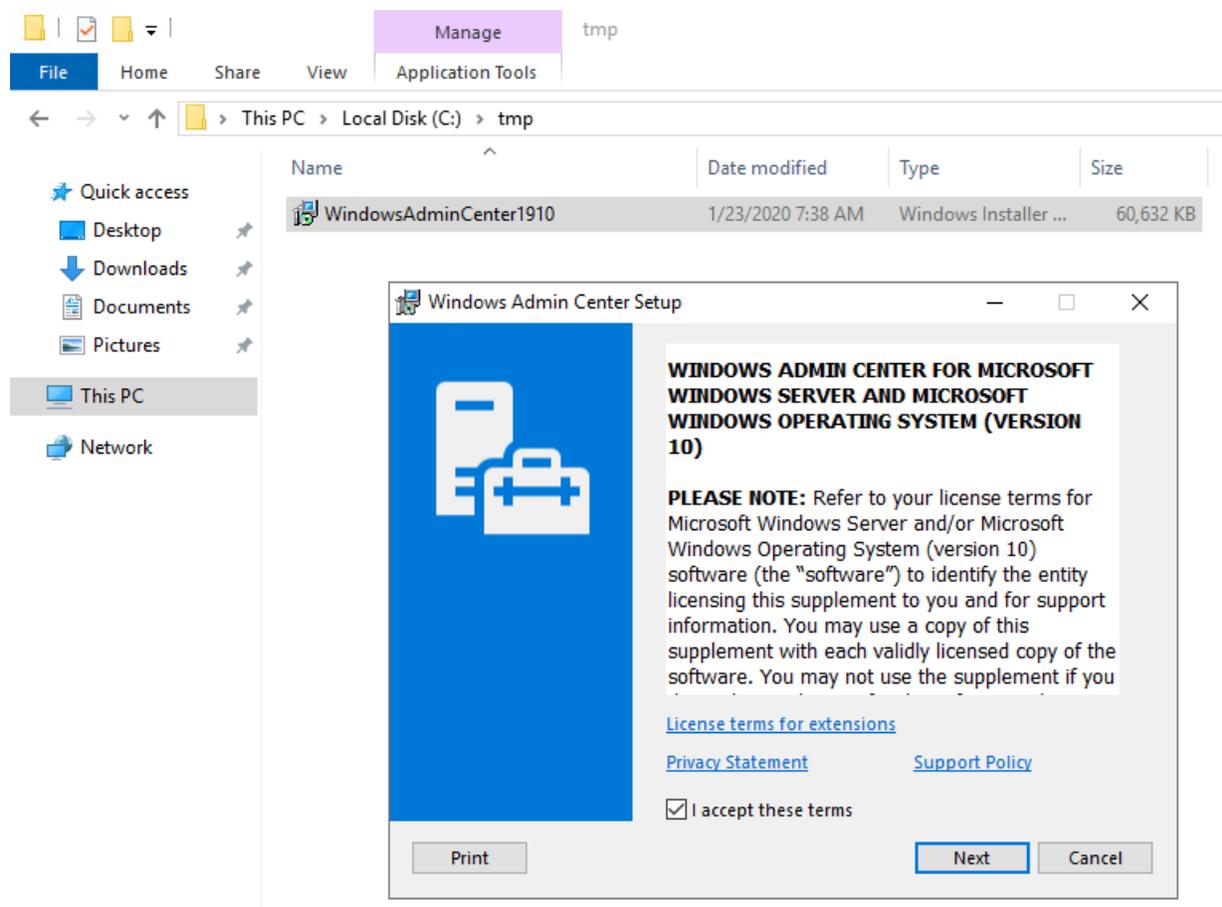
English

<https://docs.microsoft.com/en-us/windows-server/manage/windows-admin-center/overview>

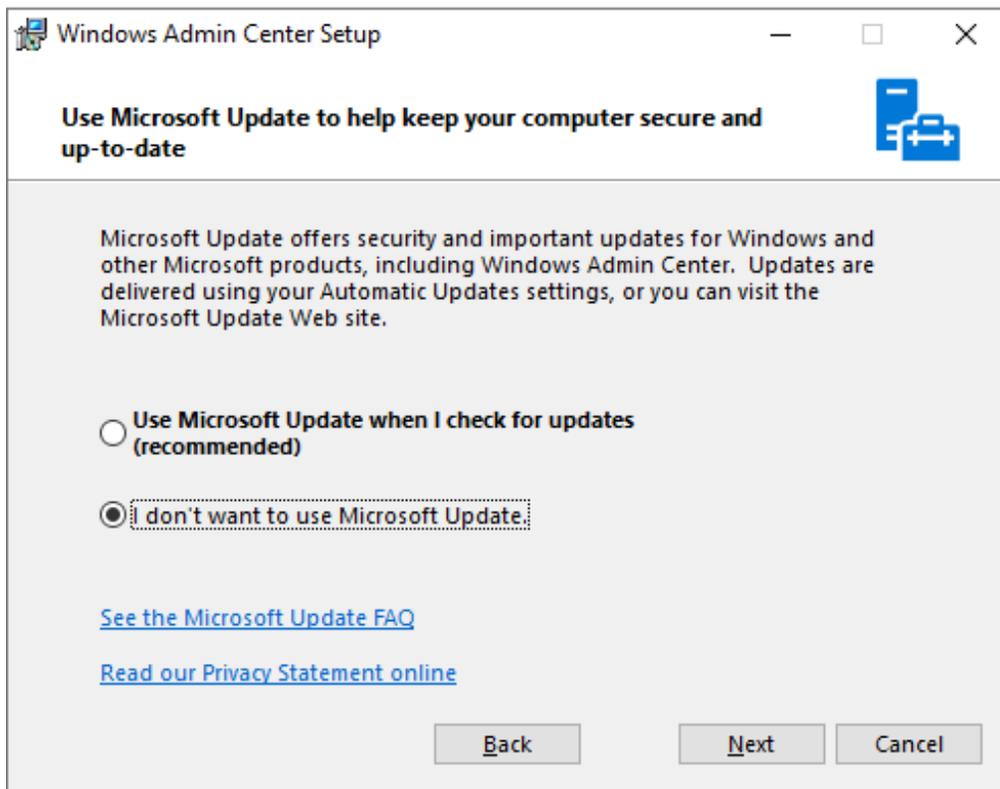
Japanese

<https://docs.microsoft.com/ja-jp/windows-server/manage/windows-admin-center/overview>

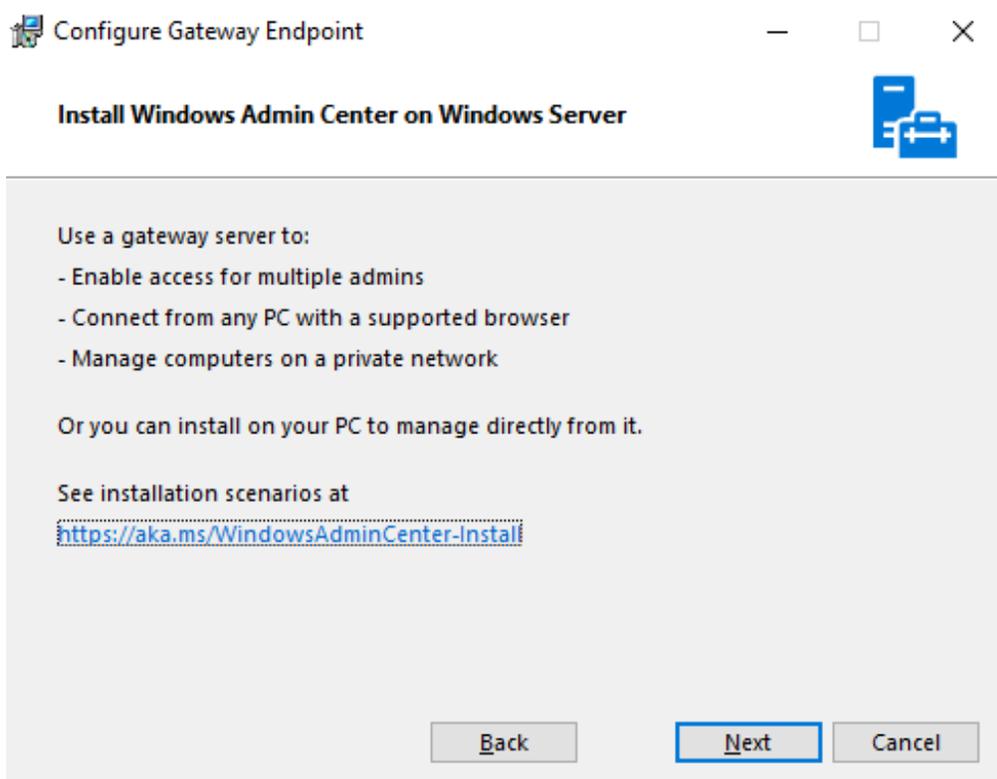
Please put the file to somewhere on Node.



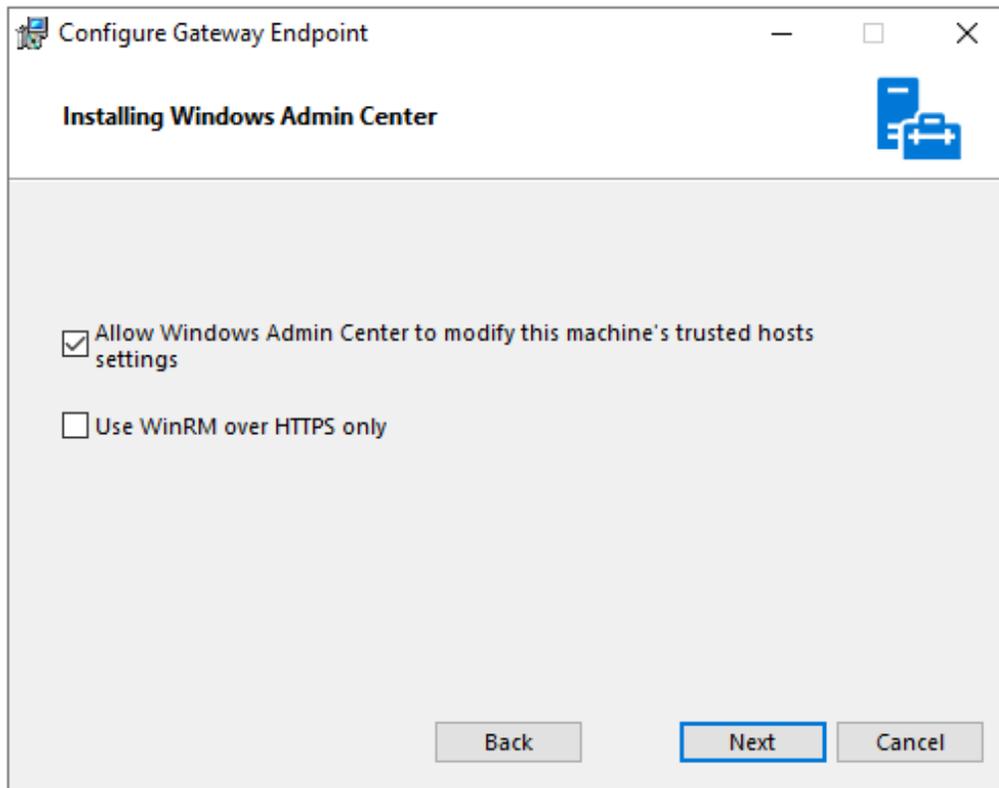
Please click “Next”.



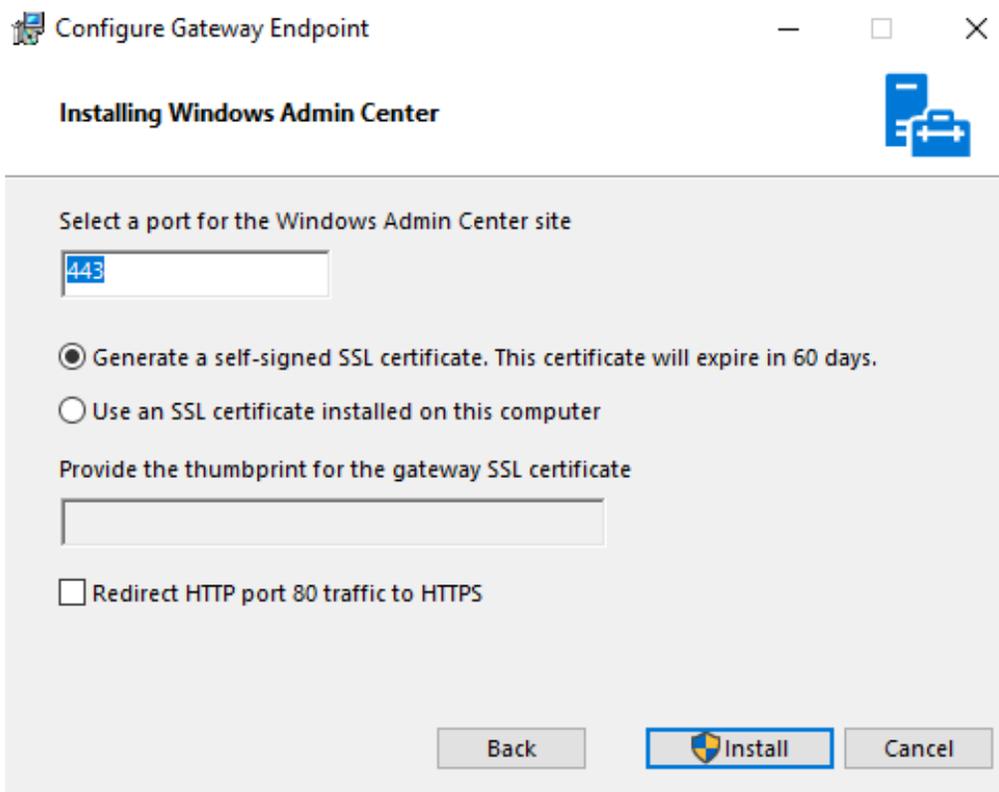
Please click “Next”.



Please click “Next”.



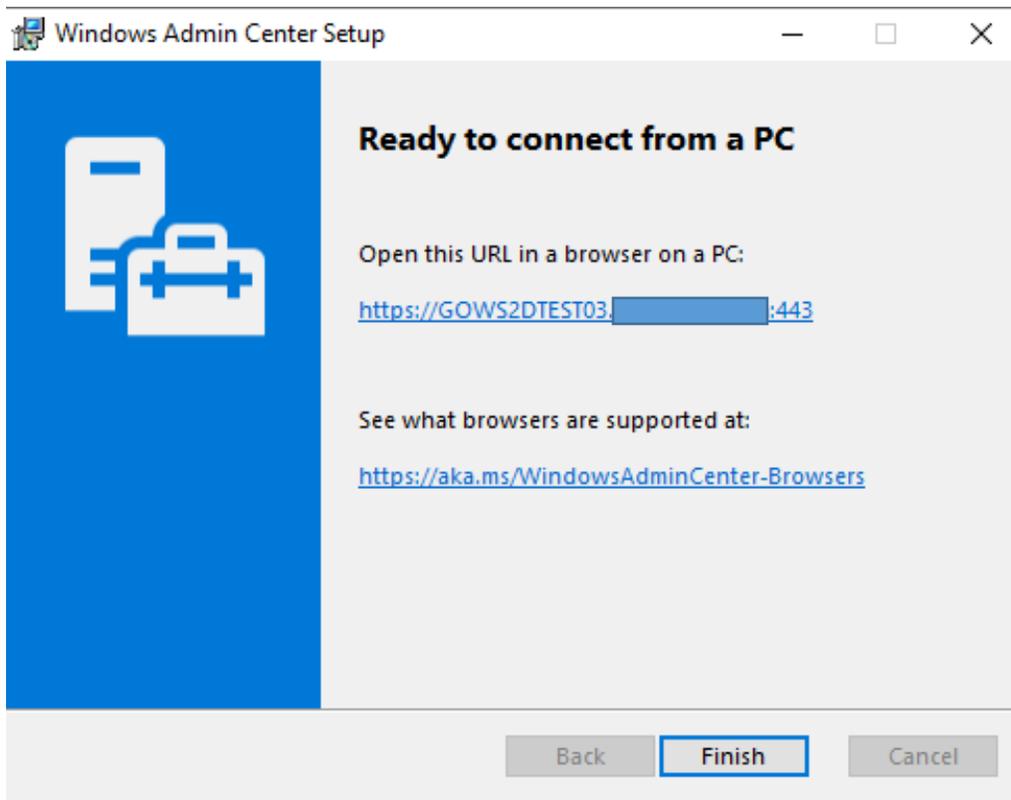
If you would like to change the port, pls put preferred port number in below.



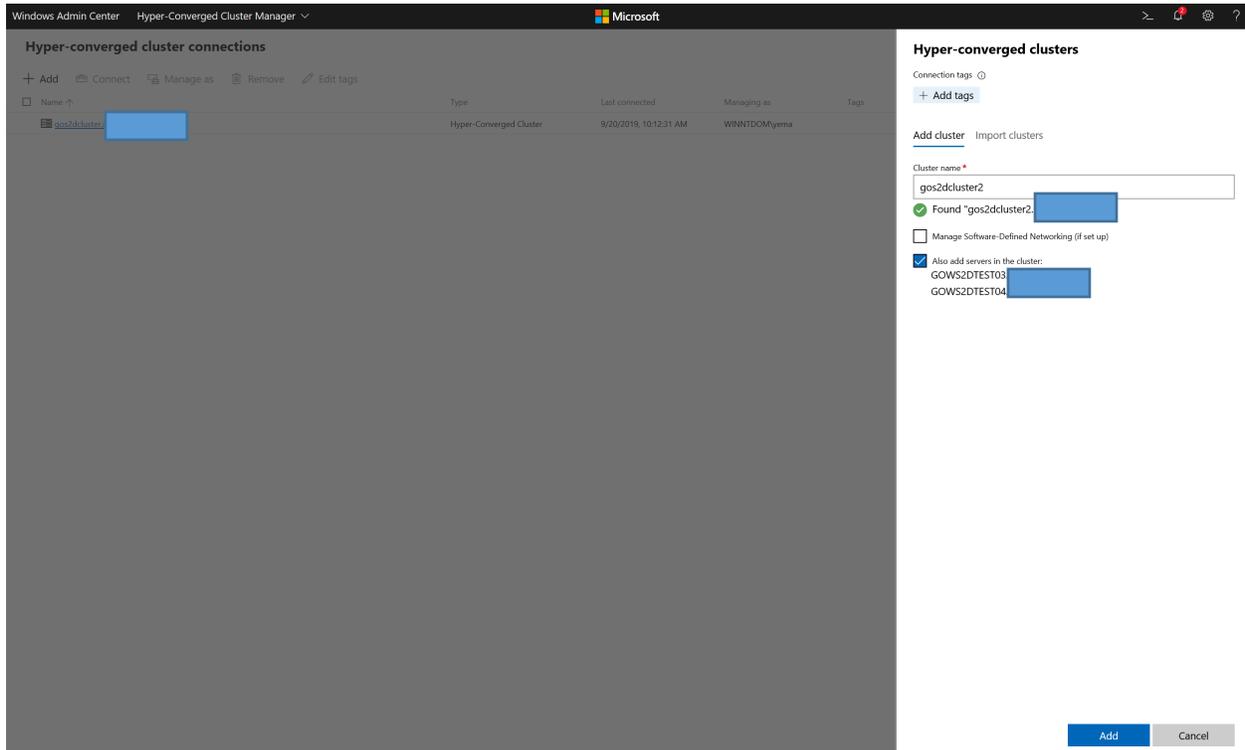
Please click “Yes”.



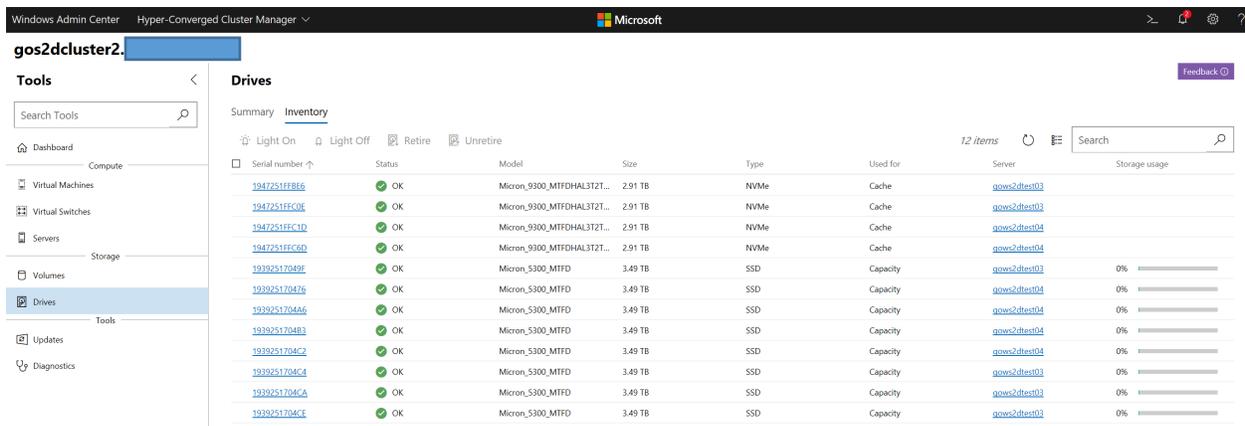
Please click “Finish”.



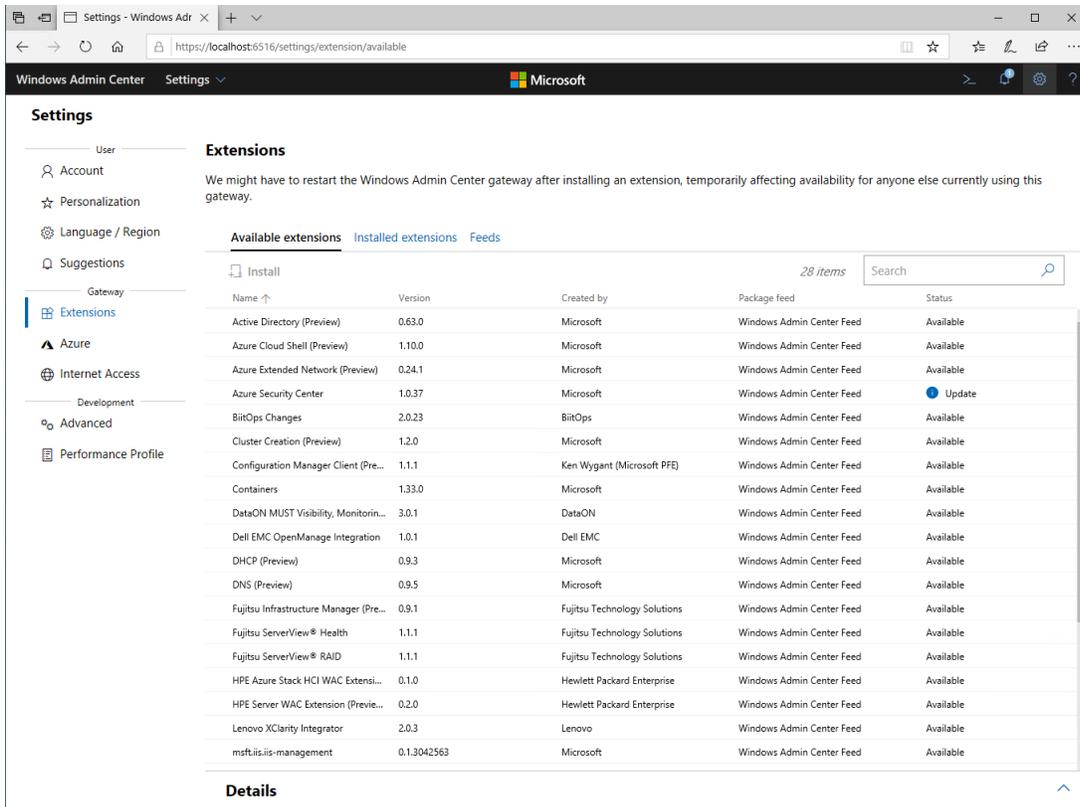
Please connect new cluster on WAC.



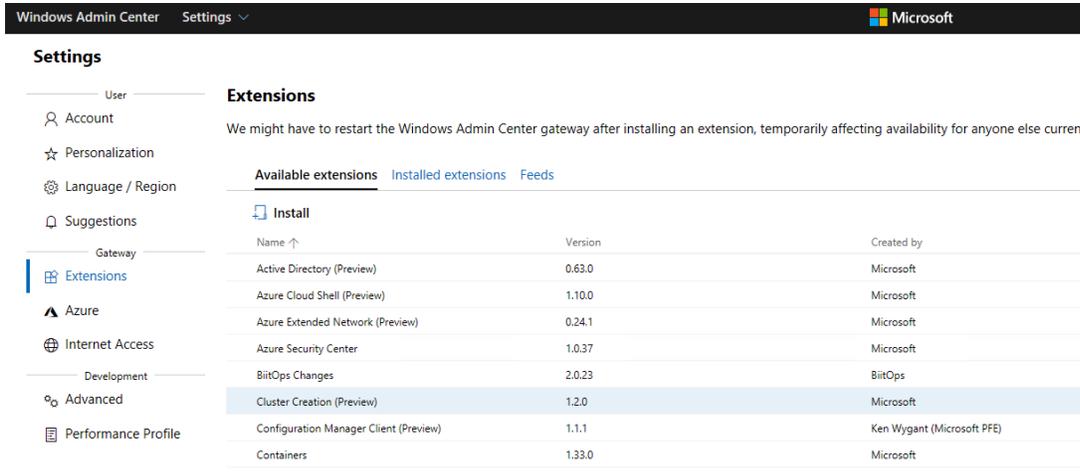
Please confirm all your disks are working fine as below.



Tips: some of major company create own plug-in for WAC. It may be good for managing your infrastructure.



The following “Cluster Creation” tool is powerful also. Please try it on your environment.



Details - Cluster Creation (Preview)

Project site

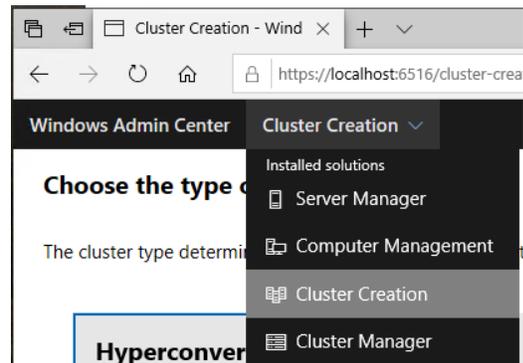
<https://aka.ms/hci-deployment>

License info

<https://aka.ms/wac-prerelease-eula>

Copyright

(c) Microsoft. All rights reserved.



Choose the type of cluster to create

The cluster type determines which server features we'll install and configure in the next steps.

Hyperconverged ✓ ✓ Failover Clustering ✓ Hyper-V ✓ Storage Spaces Direct Software-Defined Networking	Hyperconverged + SDN ✓ Failover Clustering ✓ Hyper-V ✓ Storage Spaces Direct ✓ Software-Defined Networking	Compute cluster ✓ Failover Clustering ✓ Hyper-V Storage Spaces Direct Software-Defined Networking
Storage cluster ✓ Failover Clustering Hyper-V ✓ Storage Spaces Direct Software-Defined Networking	Compute cluster + SDN ✓ Failover Clustering ✓ Hyper-V Storage Spaces Direct ✓ Software-Defined Networking	Classic failover cluster ✓ Failover Clustering Hyper-V Storage Spaces Direct Software-Defined Networking

Failover Clustering: Group servers together to increase the availability of virtual machines or apps. If a clustered server goes down, its workloads move to another server in the cluster, a process known as failover. This lets you apply updates or handle unexpected failures with a minimum of disruption.

Hyper-V: Flexibly share computing resources through hardware virtualization. Run multiple Windows or Linux operating systems side by side, isolated from each other, to avoid problems such as a crash affecting the other workloads, or to give different people access to different systems.

Storage Spaces Direct: Build software-defined storage from locally-attached flash and hard drives, eliminating the need for separate SAN or NAS arrays. Ensure fault tolerance with distributed software resiliency, increase performance with read/write caching, and save space with deduplication and compression.

Software-Defined Networking: Virtualize your network to meet the evolving needs of your apps. Prevent security vulnerabilities from spreading with micro-segmentation, access-control lists, and encrypted networks, and reduce costs with virtual appliances like the software load balancer and software gateway.

Create

Deploy hyperconverged infrastructure PREVIEW

- 1 Get Started
- 2 Networking
- 3 Clustering
- 4 Storage

- 1.1 Prerequisites
- 1.2 Enter an account
- 1.3 Add servers
- 1.4 Install features
- 1.5 Restart servers

Check the prerequisites



Before you start:

- ✓ You need two or more servers with suitable hardware.
- ✓ Each server needs a network adapter that Windows Admin Center can reach for management.
- ✓ Each server must run the Datacenter Edition of Windows Server 2019, Windows Server 2016, or Windows Server Insider Preview.
- ✓ Each server must be joined to the same Active Directory domain as where Windows Admin Center is running.
- ✓ You need a domain account that's a member of the local Administrators group on each server.

When you're ready, select Next.

Back Next

Exit

Deploy hyperconverged infrastructure PREVIEW

- 1 **Get Started**
- 2 Networking
- 3 Clustering
- 4 Storage

- 1.1 Prerequisites
- 1.2 **Enter an account**
- 1.3 Add servers
- 1.4 Install features
- 1.5 Restart servers

Enter an account

The account must be a domain account that's a member of the local Administrators group on each server.

Username *

Password *

[Back](#) [Next](#) [Exit](#)

Deploy hyperconverged infrastructure PREVIEW

- 1 **Get Started**
- 2 Networking
- 3 Clustering
- 4 Storage

- 1.1 Prerequisites
- 1.2 Enter an account
- 1.3 **Add servers**
- 1.4 Install features
- 1.5 Restart servers

Add servers

Add servers one at a time, entering the fully-qualified domain name of each server.

[Add](#)

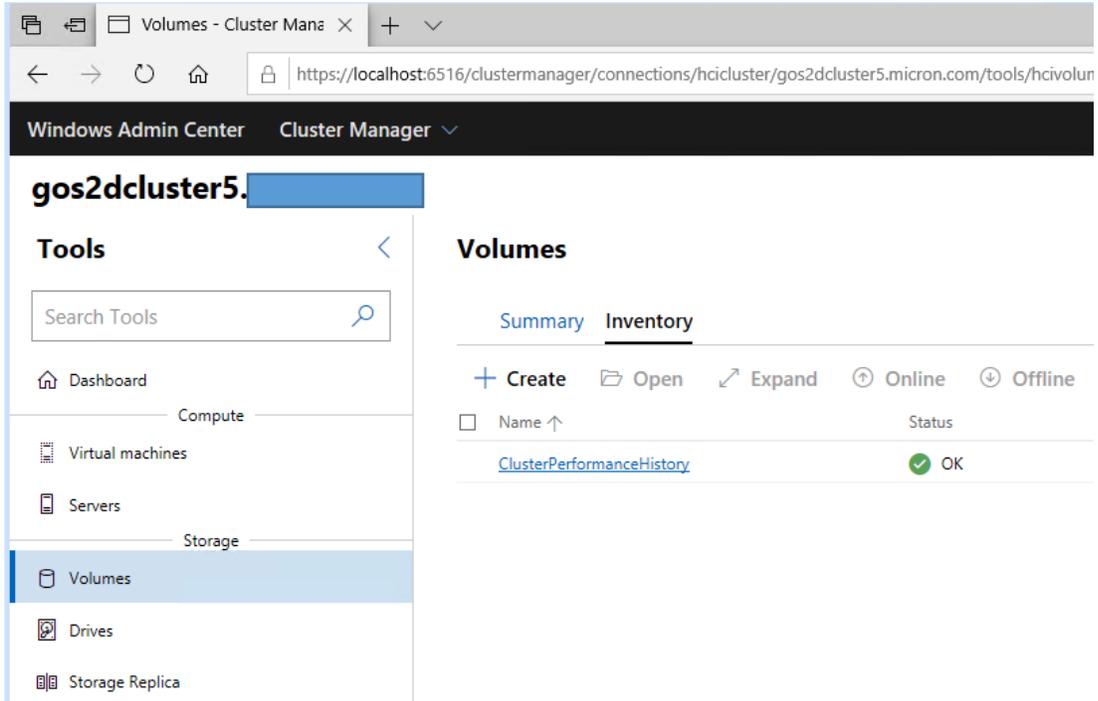
Refresh

Server name	Status	Operating system	Server model
No records found			

[Back](#) [Next](#) [Exit](#)

Create Volume, and Configure Cluster Share Volume (CVS)

Please click “Volumes”, and click “Inventory”, and click “Create”.



The screenshot shows a web browser window with the URL `https://localhost:6516/clustermanager/connections/hcicluster/gos2dcluster5.micron.com/tools/hcivolun`. The page title is "gos2dcluster5." and the breadcrumb is "Windows Admin Center > Cluster Manager > Volumes". The left sidebar shows a navigation menu with "Volumes" selected. The main content area is titled "Volumes" and has two tabs: "Summary" and "Inventory". Under the "Inventory" tab, there are several action buttons: "+ Create", "Open", "Expand", "Online", and "Offline". Below these buttons is a table with the following content:

<input type="checkbox"/>	Name ↑	Status
<input type="checkbox"/>	ClusterPerformanceHistory	OK

Please input below info for making new volume. This is test. You can put preferred name in below. Please click “Create”.

Create volume

Name *

HCILAB

Resiliency

Two-way mirror

Size on SSD *

800

Size units

GB

Estimated footprint on SSD

1.56 TB

Available on SSD

27.9 TB

More options

Deduplication and compression

Use deduplication and compression

i To use deduplication and compression, install the Data Deduplication role on every server

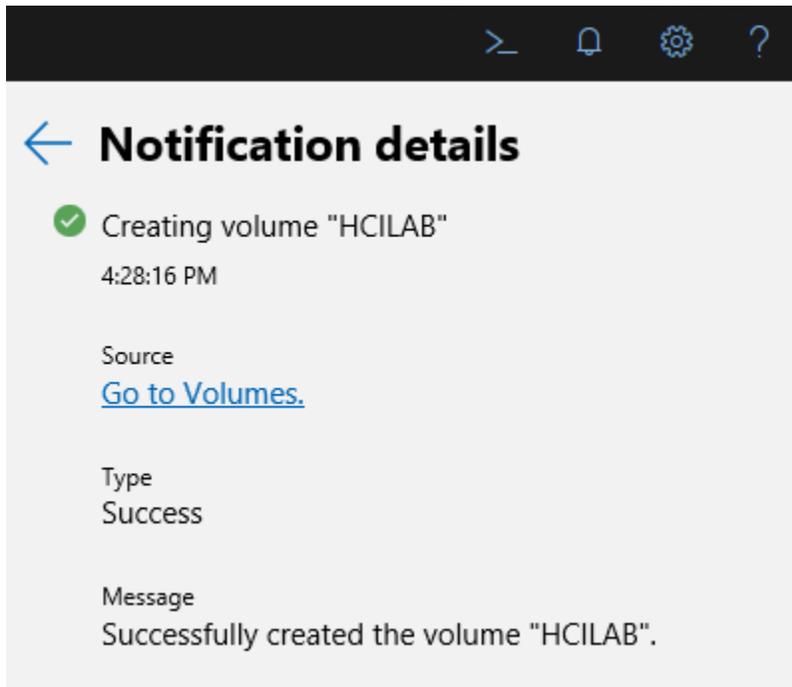
Integrity checksums

Use integrity checksums

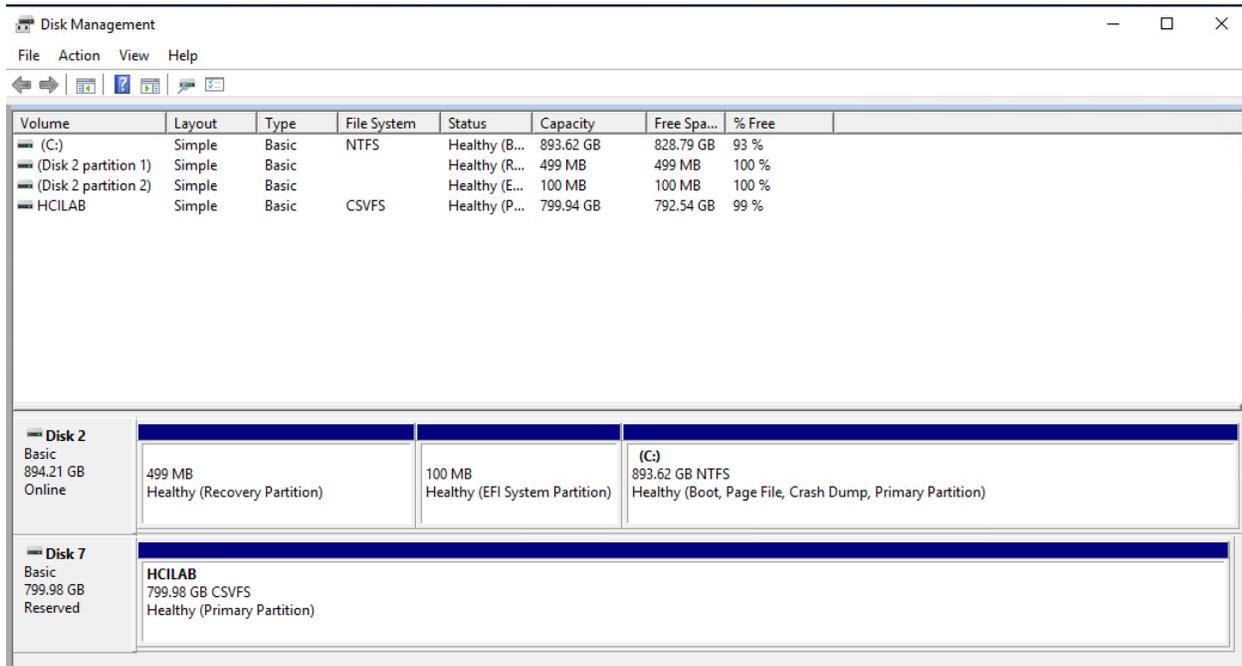
Create

Cancel

Upper right. You can see the progress.



When it is completed, you can see new volume [CSV] as below.



Please create one more with deduplication.

Create volume

Name *

HCILABdeduplication

❗ Enter a unique volume name.

Resiliency

Two-way mirror

Size on SSD *

500

Size units

GB

Estimated footprint on SSD

1000 GB

Available on SSD

27.9 TB

More options

Deduplication and compression

Use deduplication and compression

❗ To use deduplication and compression, install the Data Deduplication role on every server

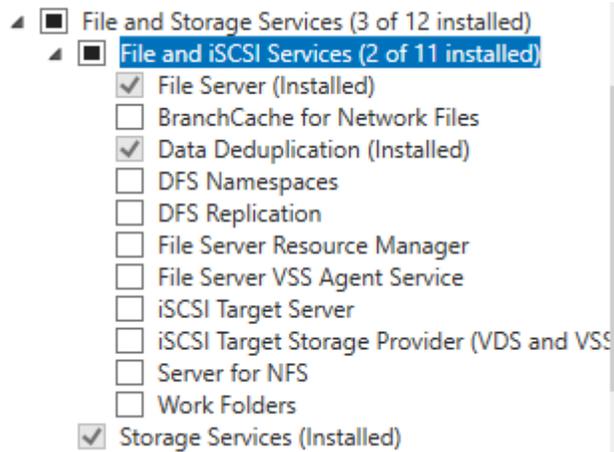
Integrity checksums

Use integrity checksums

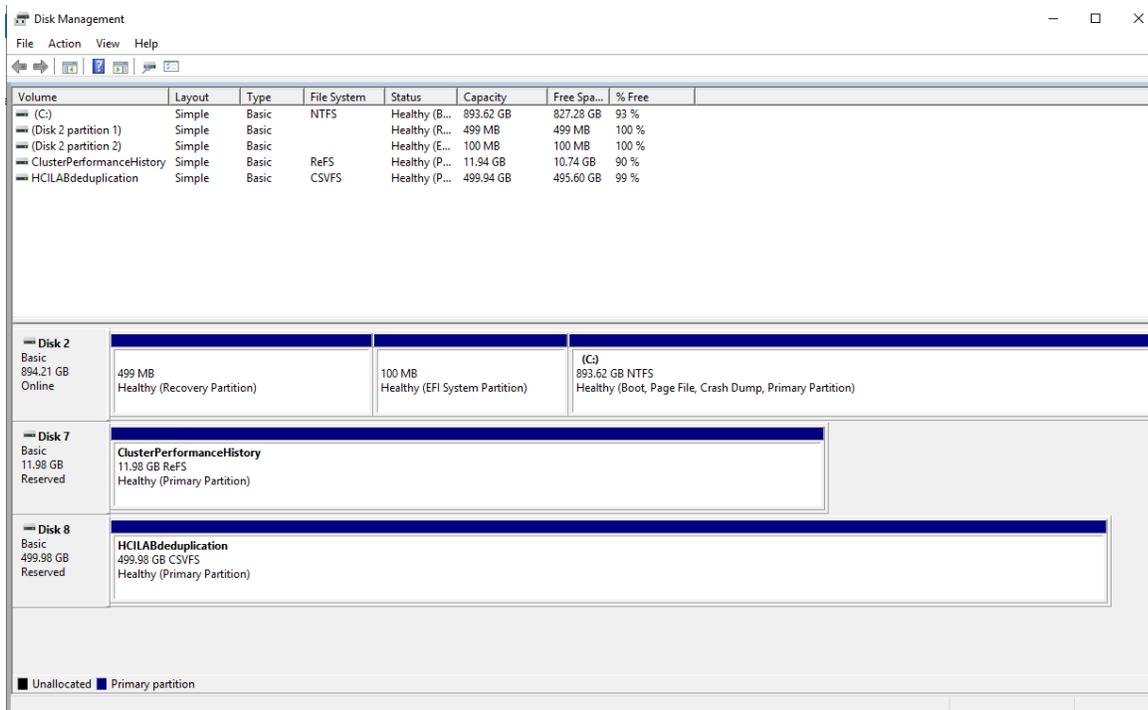
Create

Cancel

If you did not install the function, please install it at first. It was same way when you install Hyper-V tool to the node. But you must install the function to all Nodes. Please enable “Deduplication and compression”.

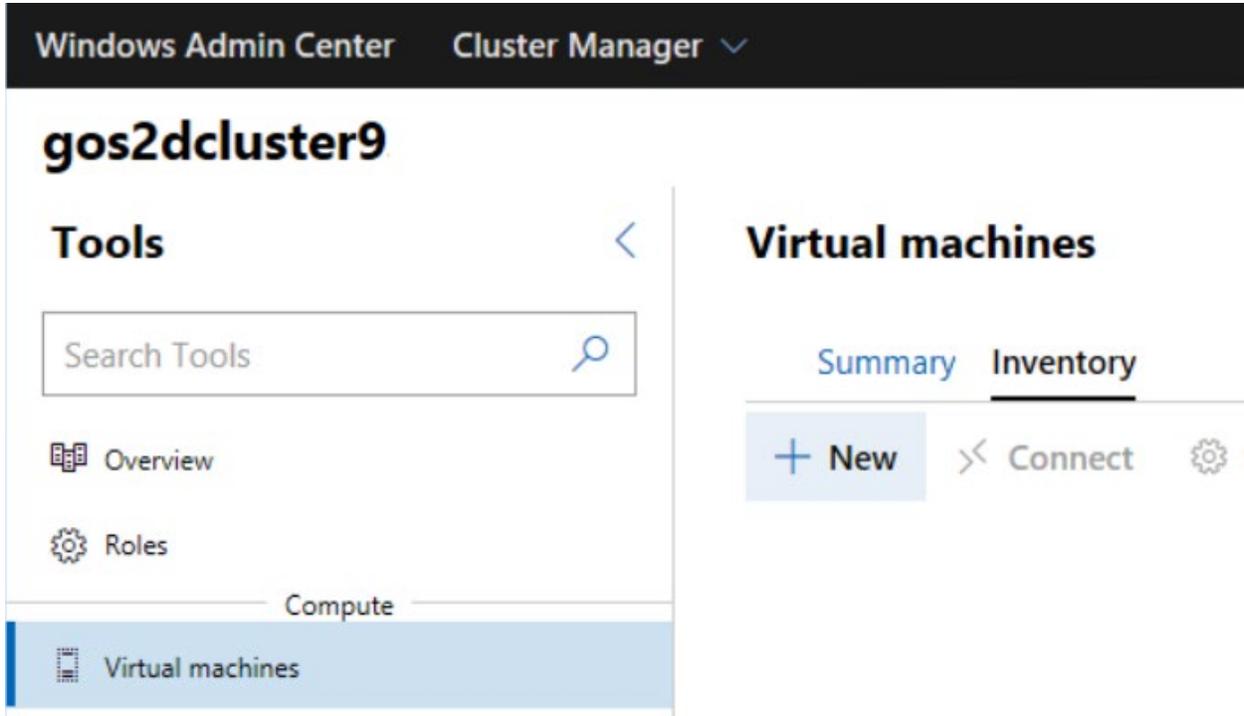


You can check it as below after creating it.



Install New VM for Client

Please click “Virtual Machine” on Windows Admin Center as below. And Please click “new in Inventory”.



Please put below info. You can put preferred name/setting.

New virtual machine

Name *

Generation

Host

Path ⓘ

i VM configuration: C:\ClusterStorage\Collect\Hyper-V\Client1
Virtual hard disks: C:\Users\Public\Documents\Hyper-V\Virtual
Hard Disks

Virtual processors

Count

Enable nested virtualization

i Simultaneous multithreading is enabled for increased
performance.

Memory

Startup memory (GB) *

Use dynamic memory

Minimum memory (GB)

Maximum memory (GB)

Network

Network adapter

Storage

New disk 1 

Create an empty virtual hard disk

Size (GB)

Use an existing virtual hard disk

Path: *

+ Add

Operating system

- Install an operating system later
- Install an operating system from an image file (.iso)

Path: *

You can see new VM as below. Please check new VM and click “Start”.

Tools

[Dashboard](#)
[Compute](#)
Virtual machines

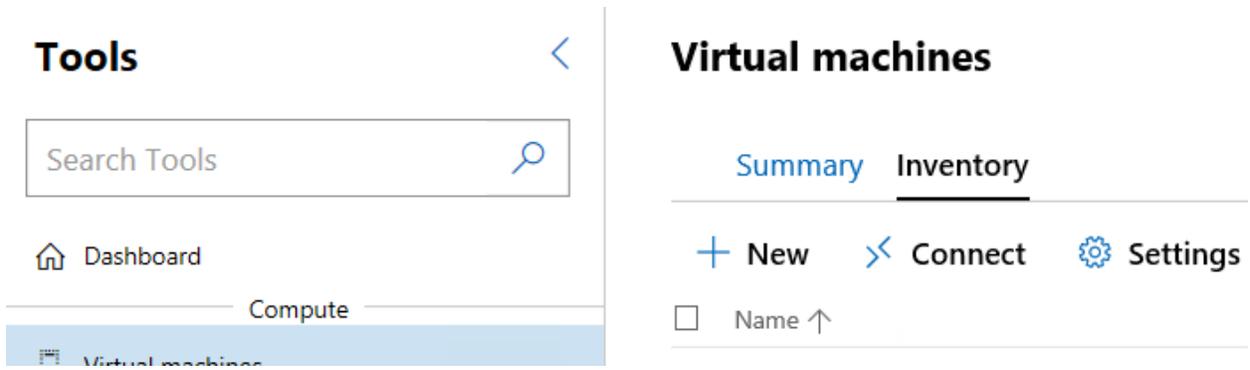
Virtual machines

[Summary](#) [Inventory](#)

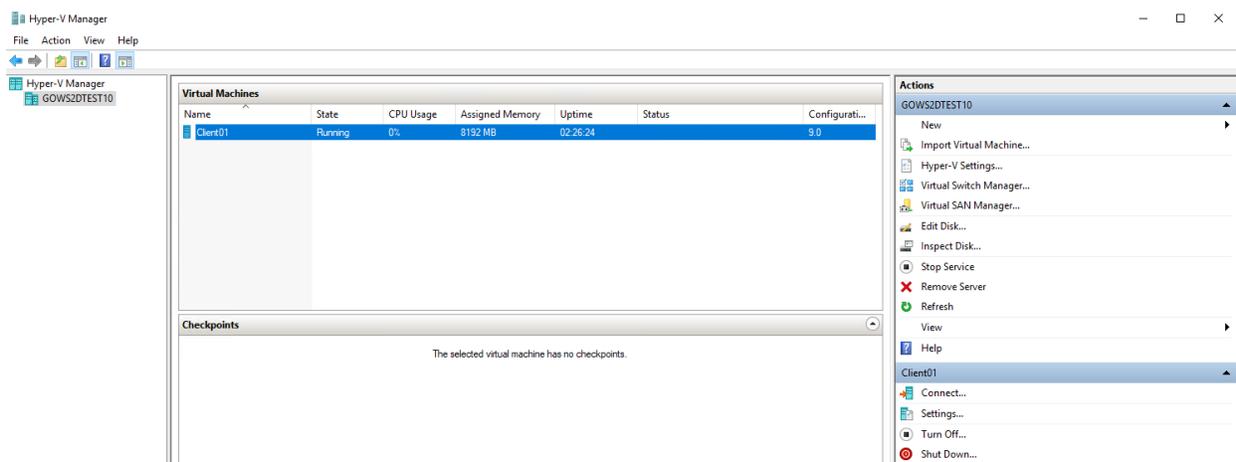
[+ New](#) [< Connect](#) [Settings](#) [▶ Start](#)

<input type="checkbox"/> Name ↑	State
✓ GoldVMFleet4	Stopped

Please click “Connect” and install OS.



You can do same operation on Hype-V manager also.

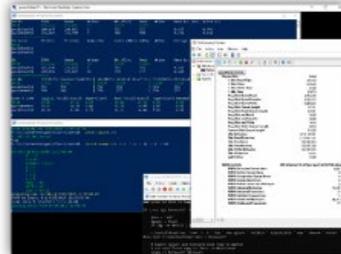
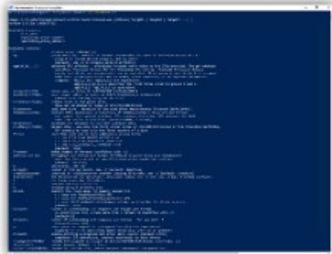


You can use PXE boot if your company is using the way for installing OS.

Performance Test Using Official Microsoft Tool



Microsoft disk benchmarking tool and stress test tool for S2D



It will be better to test your cluster before promoting it to production. You can plan to do the scale-out well with good actual information.

Please create new volume

Windows Admin Center Cluster Manager

gos2dcluster2

Tools

Search Tools

Dashboard

Compute

Virtual machines

Servers

Storage

Volumes

Drives

Networking

Virtual switches

Volumes

Summary Inventory

+ Create Open Expand Online

Name ↑	Status	File system
ClusterPerformanceHis...	OK	ReFS

The name will be “Collect”.

Create volume

Name *

Collect

Resiliency

Two-way mirror

Size on SSD *

500

Size units

GB

Estimated footprint on SSD

1000 GB

Available on SSD

27.9 TB

More options >

Deduplication and compression, integrity checksums

Create

Cancel

Please confirm new volume is created on WAC.

Volumes

Summary **Inventory**

+ Create Open Expand Online Offline Delete 2 items Search

Name ↑	Status	File system	Resiliency	Size	Storage usage	IOPS
ClusterPerformanceHis...	OK	ReFS	Two-way mirror	11.9 GB	10%	
Collect	OK	CSVFS_ReFS	Two-way mirror	500 GB	1%	

Please create other Volume with your Node name (Server host name).

This is for Node01.

Create volume

Name *

Node01

Resiliency

Two-way mirror

Size on SSD *

300

Size units

GB

Estimated footprint on SSD

600 GB

Available on SSD

27.9 TB

More options >

Deduplication and compression, integrity checksums

Create

Cancel

This is for Node02.

Create volume

Name *

Resiliency

Size on SSD *

Size units

Estimated footprint on SSD

600 GB

Available on SSD

27.9 TB

More options >

Deduplication and compression, integrity checksums

Please confirm both volumes are available or not on WAC.

Volumes

Summary **Inventory**

+ Create Open Expand Online Offline Delete 4 items Search

Name ↑	Status	File system	Resiliency	Size	Storage usage	IOPS
ClusterPerformanceHis...	✓ OK	ReFS	Two-way mirror	11.9 GB	10%	
Collect	✓ OK	CSVFS_ReFS	Two-way mirror	500 GB	1%	0
Node01	✓ OK	CSVFS_ReFS	Two-way mirror	300 GB	1%	0
Node02	✓ OK	CSVFS_ReFS	Two-way mirror	300 GB	1%	

You can create CSV with PowerShell command also. Please try to use below if you want.

```
New-Volume -StoragePoolFriendlyName "S2D*" -FriendlyName Collect -FileSystem  
CSVFS_ReFS -Size 500GB
```

```
New-Volume -StoragePoolFriendlyName "S2D*" -FriendlyName Node01 -FileSystem  
CSVFS_ReFS -Size 300GB
```

```
New-Volume -StoragePoolFriendlyName "S2D*" -FriendlyName Node02 -FileSystem  
CSVFS_ReFS -Size 300GB
```

Please download VM Fleet from Github. <https://github.com/Microsoft/diskspd>

6 contributors MIT

Find file Clone or download

Clone with HTTPS ?
Use Git or checkout with SVN using the web URL.

`https://github.com/microsoft/diskspd.git`

Open in Desktop Download ZIP

Extract Zip file to `file://C:%temp` on Node01.

diskspd-master

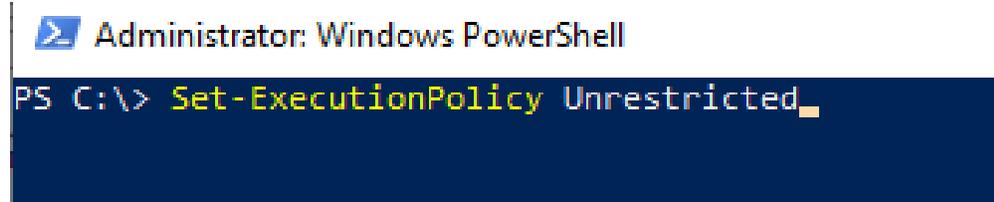
File Home Share View

This PC > Local Disk (C:) > Temp > diskspd-master >

Name	Date modified	Type	Size
CmdLineParser	1/23/2020 8:13 AM	File folder	
CmdRequestCreator	1/23/2020 8:13 AM	File folder	
Common	1/23/2020 8:13 AM	File folder	
diskspd_vs	1/23/2020 8:14 AM	File folder	
Frameworks	1/23/2020 8:13 AM	File folder	
IORequestGenerator	1/23/2020 8:14 AM	File folder	
ResultParser	1/23/2020 8:14 AM	File folder	
UnitTests	1/23/2020 8:14 AM	File folder	
XmlProfileParser	1/23/2020 8:14 AM	File folder	
XmlResultParser	1/23/2020 8:14 AM	File folder	
.gitignore	1/23/2020 8:13 AM	GITIGNORE File	3 KB
diskspd.wprp	1/23/2020 8:13 AM	WPRP File	3 KB
LICENSE	1/23/2020 8:13 AM	File	2 KB
Process-DiskSpd	1/23/2020 8:13 AM	Windows PowerS...	9 KB
README.md	1/23/2020 8:13 AM	MD File	7 KB

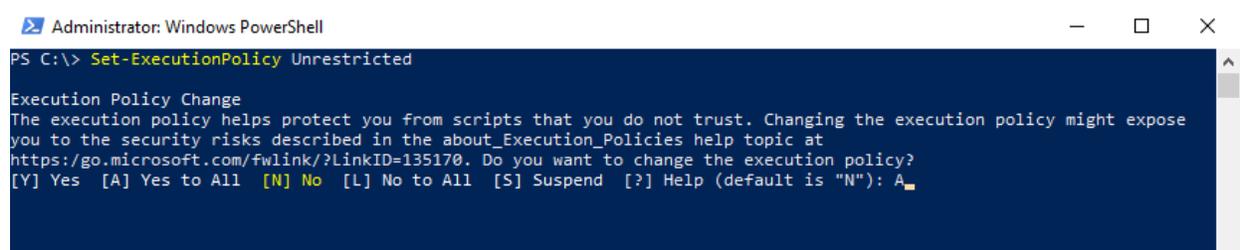
You ready to install VM Fleet thought Internet. You need to change the policy for PowerShell.

Please run below command.



```
Administrator: Windows PowerShell
PS C:\> Set-ExecutionPolicy Unrestricted
```

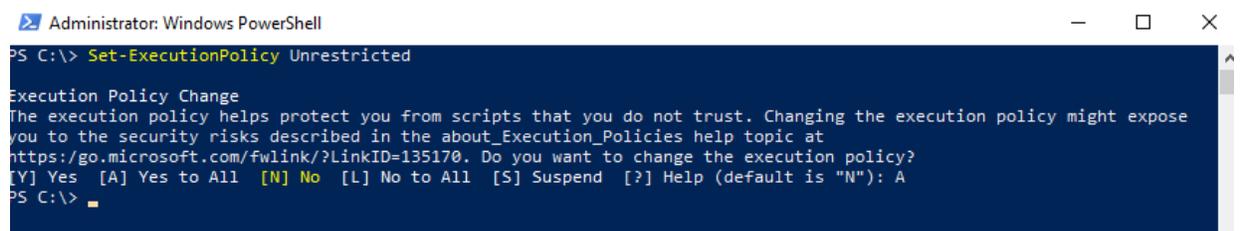
Please click “A -Yes to All”.



```
Administrator: Windows PowerShell
PS C:\> Set-ExecutionPolicy Unrestricted

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose you to the security risks described in the about_Execution_Policies help topic at https://go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "N"): A
```

Please click “A -Yes to All” again.



```
Administrator: Windows PowerShell
PS C:\> Set-ExecutionPolicy Unrestricted

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose you to the security risks described in the about_Execution_Policies help topic at https://go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "N"): A
PS C:\>
```

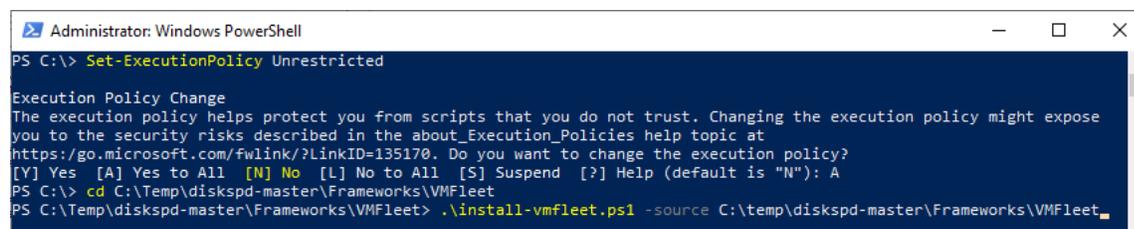
You can ready to install VM Fleet to your cluster. Please move to below directory.

<File://C:¥Temp¥diskspd-master¥Frameworks¥VMFleet>

Run below command

.¥install-vmfleet.ps1 -source C:¥temp¥diskspd -master¥Frameworks¥VMFleet

Please click



```
Administrator: Windows PowerShell
PS C:\> Set-ExecutionPolicy Unrestricted

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose you to the security risks described in the about_Execution_Policies help topic at https://go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "N"): A
PS C:\> cd C:\Temp\diskspd-master\Frameworks\VMFleet
PS C:\Temp\diskspd-master\Frameworks\VMFleet> .\install-vmfleet.ps1 -source C:\temp\diskspd-master\Frameworks\VMFleet
```

The file will be installed to below folder.

<File://C:%26ClusterStorage%26collect%26control>

```
Administrator: Windows PowerShell
PS C:\> Set-ExecutionPolicy Unrestricted

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose you to the security risks described in the about_Execution_Policies help topic at https://go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "N"): A
PS C:\> cd C:\Temp\diskspd-master\Frameworks\VMFleet
PS C:\Temp\diskspd-master\Frameworks\VMFleet> .\install-vmfleet.ps1 -source C:\temp\diskspd-master\Frameworks\VMFleet

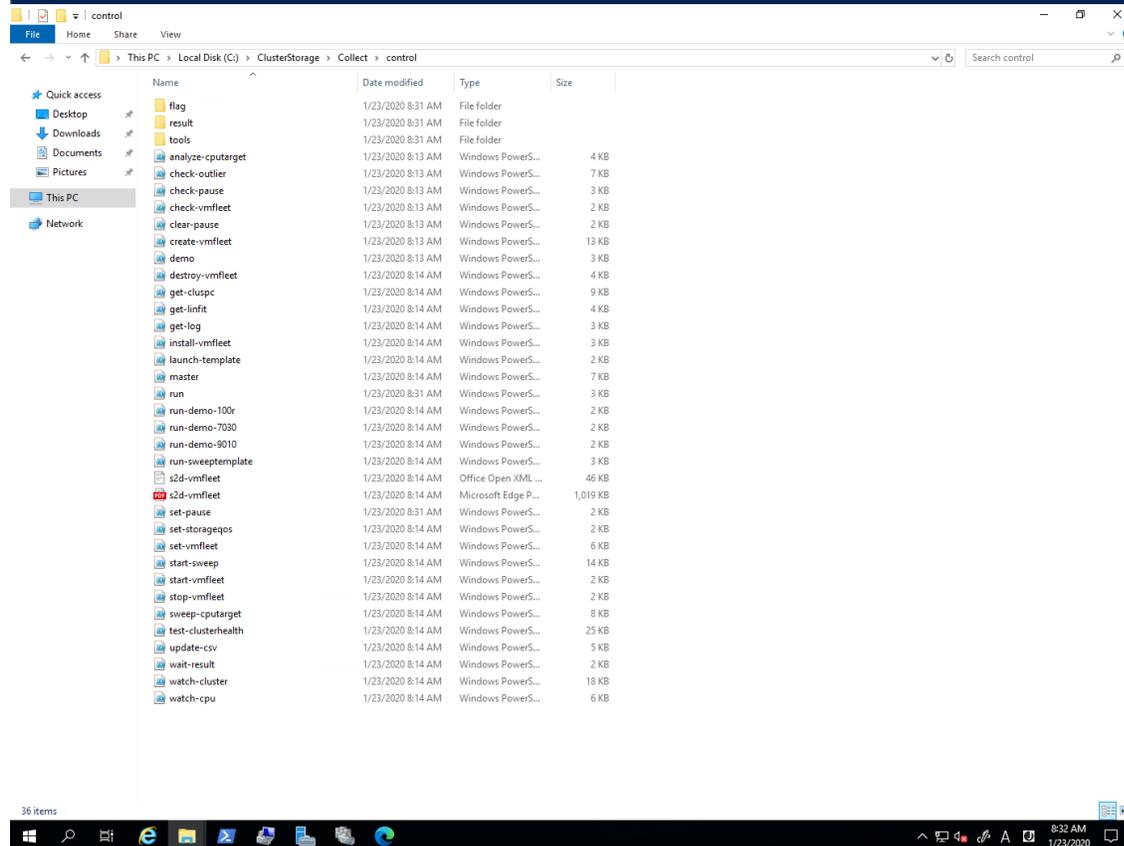
Security warning
Run only scripts that you trust. While scripts from the internet can be useful, this script can potentially harm your computer. If you trust this script, use the Unblock-File cmdlet to allow the script to run without this warning message. Do you want to run C:\Temp\diskspd-master\Frameworks\VMFleet\install-vmfleet.ps1?
[D] Do not run [R] Run once [S] Suspend [?] Help (default is "D"): R

Security warning
Run only scripts that you trust. While scripts from the internet can be useful, this script can potentially harm your computer. If you trust this script, use the Unblock-File cmdlet to allow the script to run without this warning message. Do you want to run C:\temp\diskspd-master\Frameworks\VMFleet\update-csv.ps1?
[D] Do not run [R] Run once [S] Suspend [?] Help (default is "D"): R

Directory: C:\ClusterStorage\collect\control

Mode                LastWriteTime         Length Name
----                -
d-----            1/23/2020  8:31 AM             result
d-----            1/23/2020  8:31 AM             flag
d-----            1/23/2020  8:31 AM             tools
Pause set @ 1/23/2020 8:31:25 AM

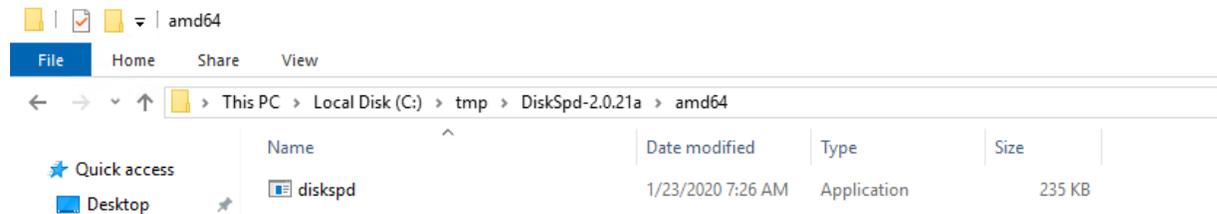
PS C:\Temp\diskspd-master\Frameworks\VMFleet>
```



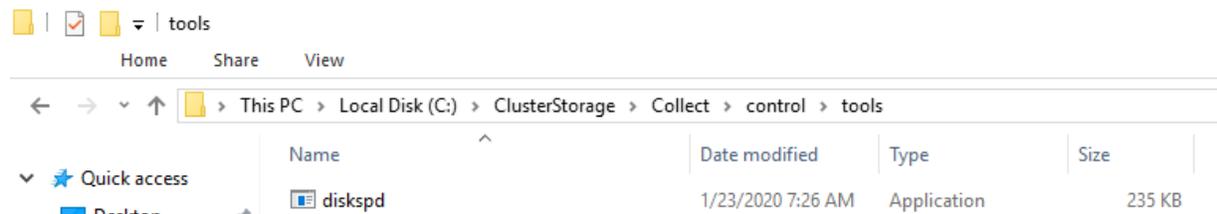
Please download diskspd from below link. If you cannot access it. Please find out it using WEB search engine.

<https://gallery.technet.microsoft.com/DiskSpd-A-Robust-Storage-6ef84e62>

Please extract it under C:\temp.

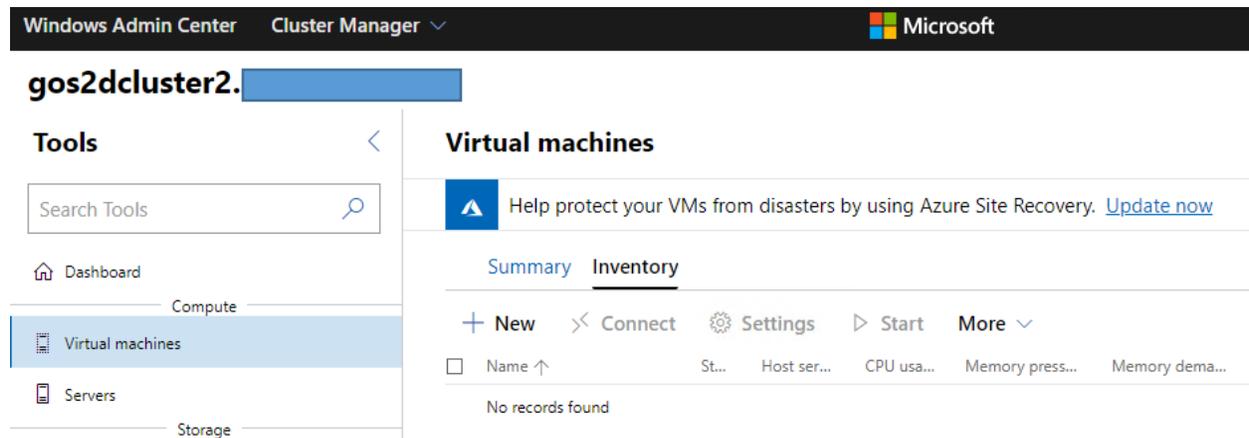


Please copy diskspd under amd64 folder to <file:///C:/ClusterStorage/Collect/Control/Tools>.



Please put your OS installation ISO file to C:\ClusterStorage\Collect\Software. You will use Windows Server 2019 Core. (no need desktop experience).

Create the gold image – Please create new VM on WAC.



Please follow below.

New virtual machine

Name *

GoldVMFleet

Generation

Generation 2 (Recommended)

Host

gows2dtest03. (Recommended)

Path ⓘ

C:\ProgramData\Microsoft\Windows\Hyp

Browse

i The VM configuration and virtual hard disks are saved under C:\ProgramData\Microsoft\Windows\Hyper-V\GoldVMFleet

Virtual processors

Count

2

Enable nested virtualization

i Simultaneous multithreading is enabled for increased performance.

Memory

Startup memory (GB) *

4

Use dynamic memory

Minimum memory (GB)

4

Maximum memory (GB)

8

Network

Network adapter

Not connected

Storage

New disk 1 

Create an empty virtual hard disk

Size (GB)

Use an existing virtual hard disk

Path: *

+ Add

Operating system

- Install an operating system later
- Install an operating system from an image file (.iso)

Path: *

Select an image file

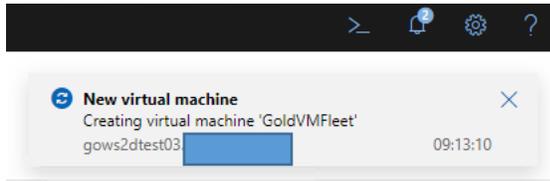
C: > ClusterStorage > Collect > Software 

 New Folder  Up 1 item 

Name	Date Modified	Type	Size
SW_DVD9_Win_Server_STD_CORE_201...	28/11/2018, 16:12:36	File	4,729,508 KB

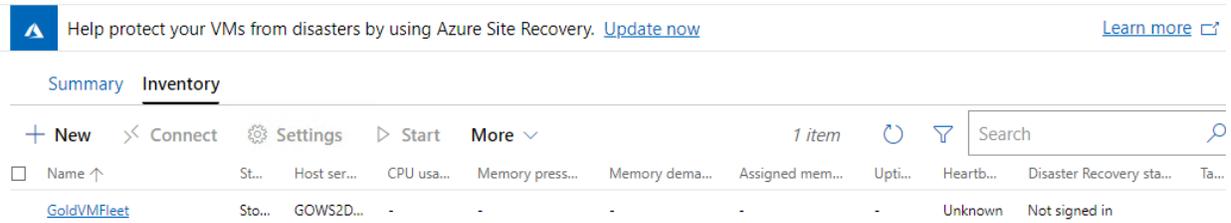
File name: File extension: Disc image files (*.iso) 

You can observe the progress around upper right.

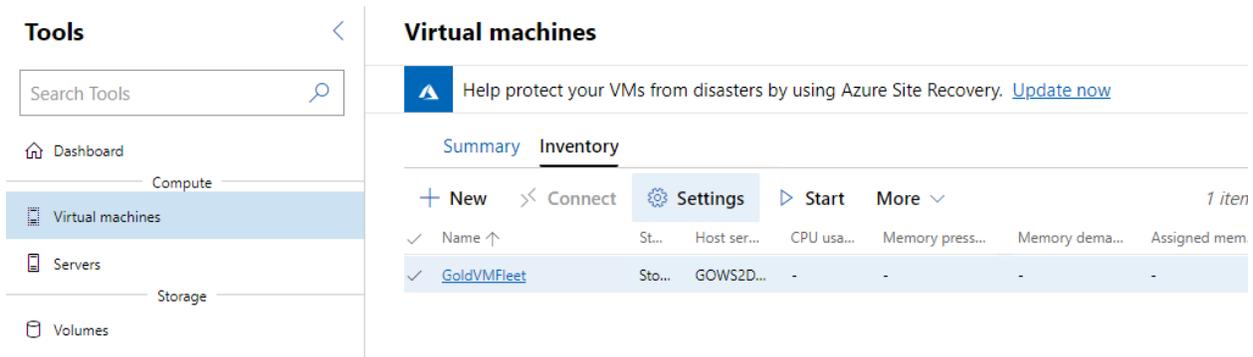


Please confirm whether it is created or not on WAC.

Virtual machines

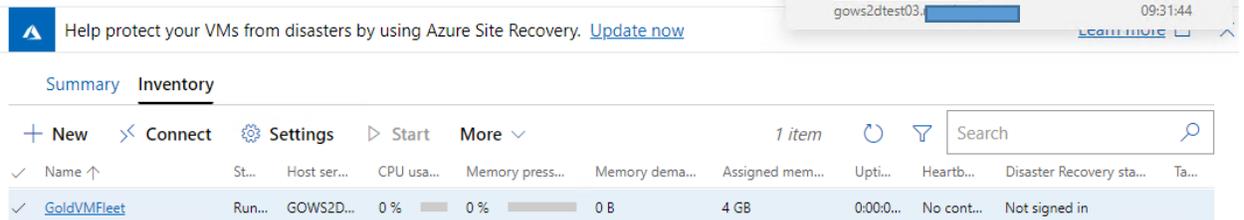


Please click "Start".



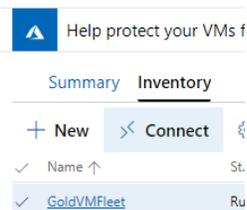
m

Virtual machines



Please click "Connect".

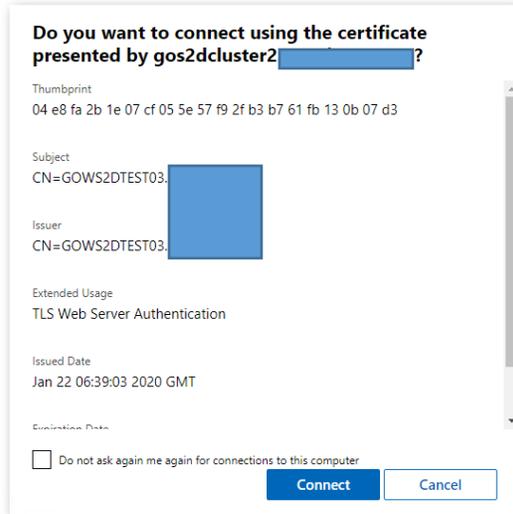
Virtual machines



Please click "Connect".

Virtual machines \ GoldVMFleet \ **VM Connect** Basic Session

✕ Disconnect



Please input administrator password.

Enter credentials for the Remote Desktop connection

Username:

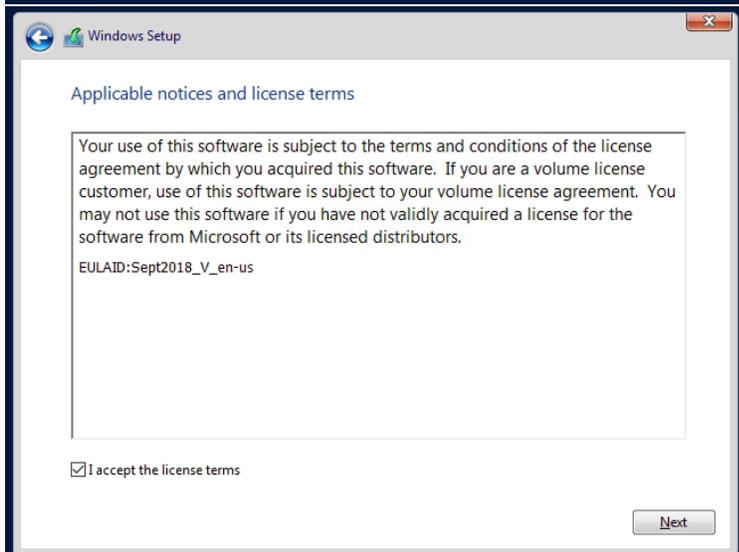
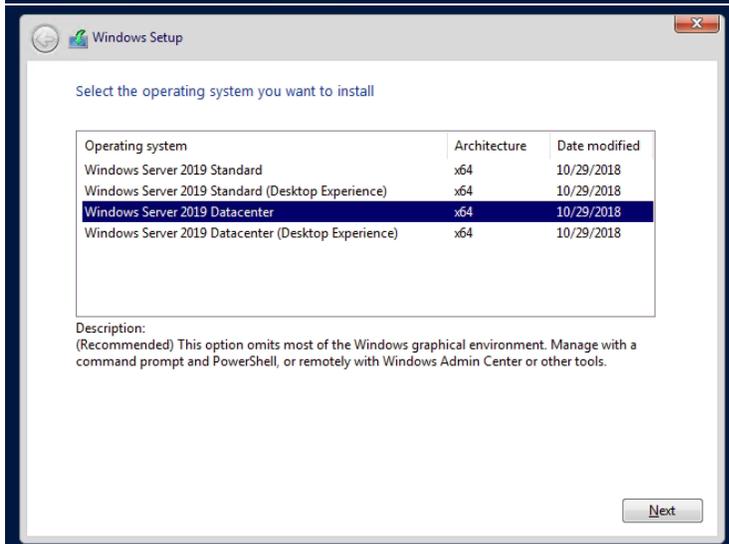
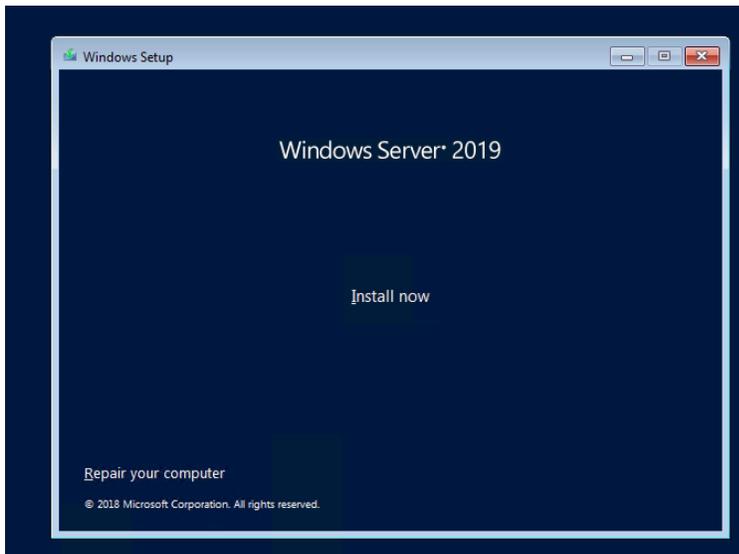
administrator

Password:

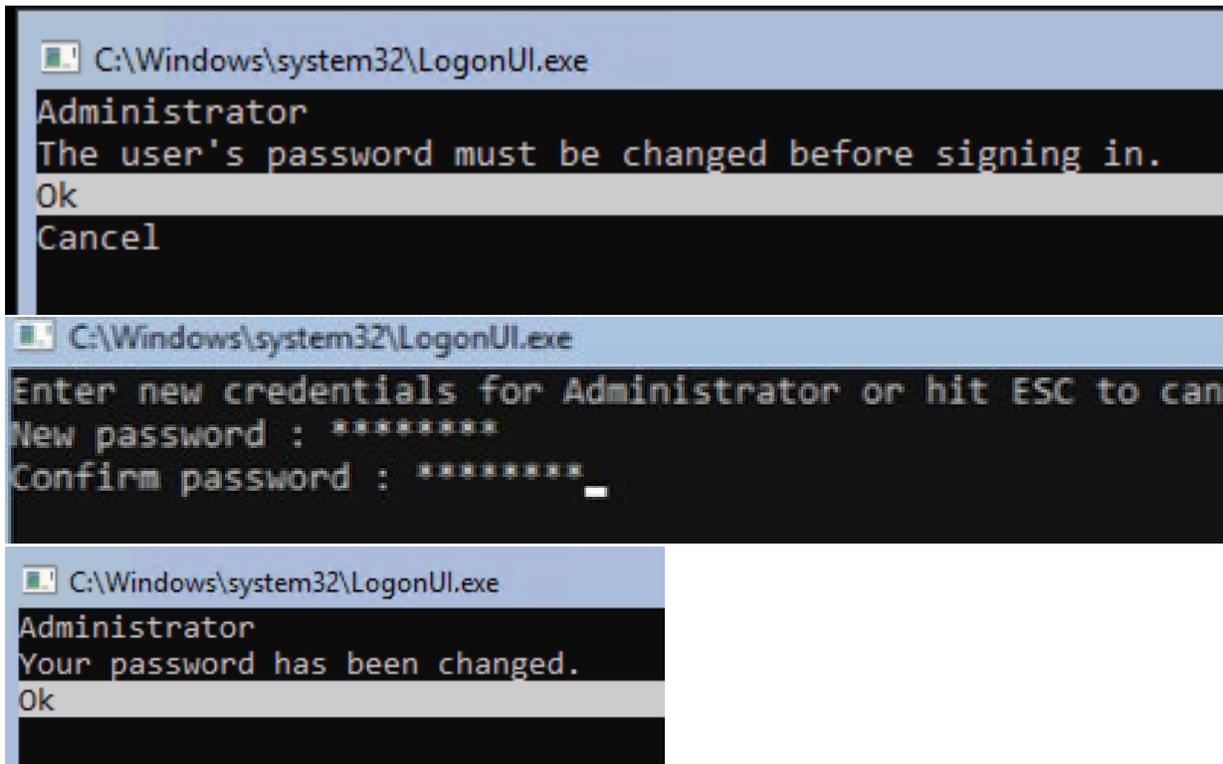
.....



Please start to install Windows Server 2019 Datacenter (not Desktop Experience).



Please change the password as below.

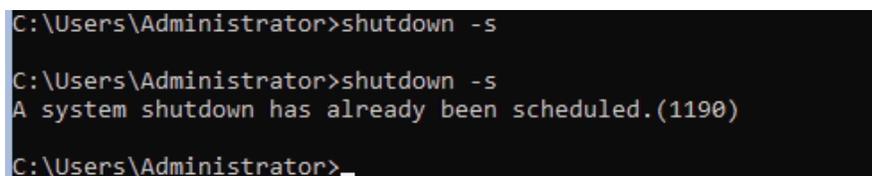


Please shutdown your VM with below command.

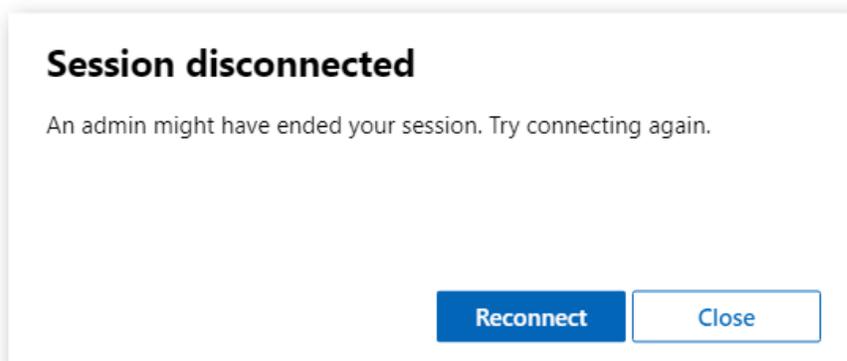
Shutdown -s

Or

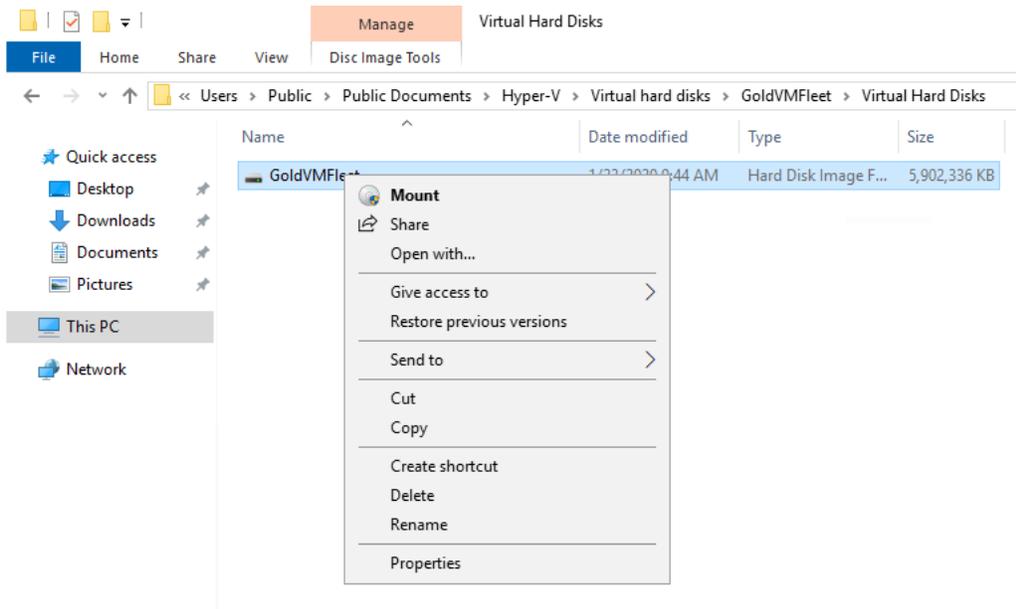
Shutdown -f -s -t 1



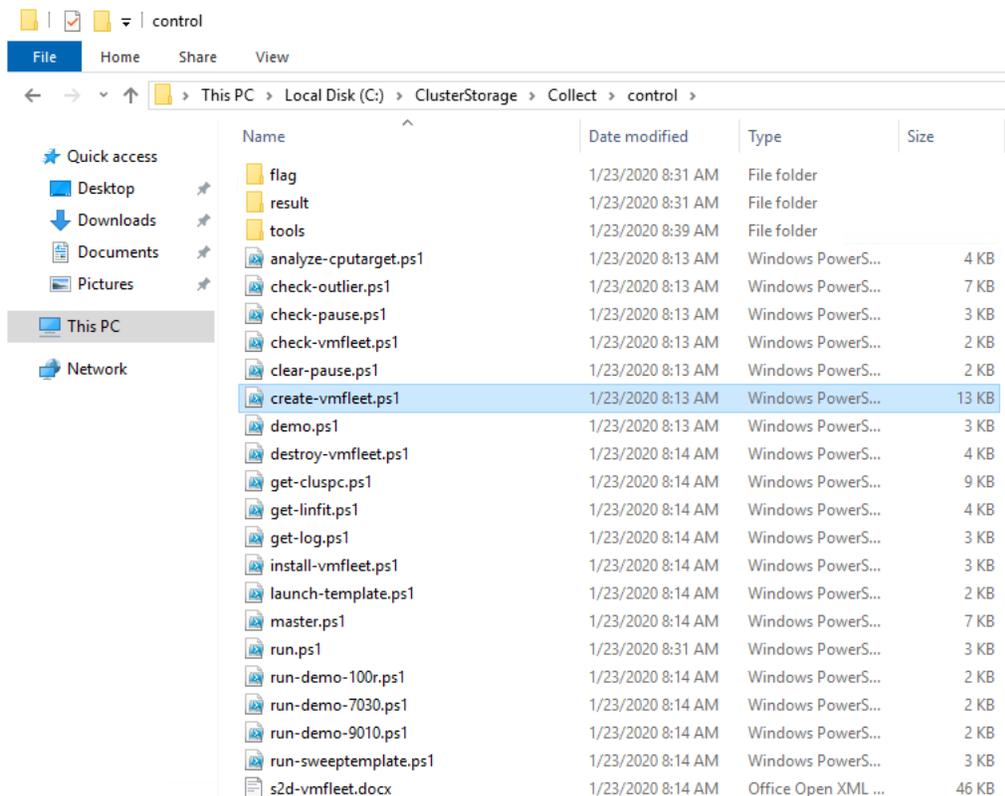
You will see below.



Please copy the VHDX to <file:///C:/%ClusterStorage%Collect>.



You are ready to deploy VMs to your cluster.



Please run below command. Please change below red color to correct one which you put.
`.\create-vmfleet.ps1 -basevhd "C:\ClusterStorage\Collect\GoldVMFleet.vhdx" -VMs 20 -adminpass Password -connectuser administrator -connectpass Password`

The script will create VMs automatically.

```
PS C:\Temp\diskspd-master\Frameworks\VMFleet> cd C:\ClusterStorage\Collect\control
PS C:\ClusterStorage\Collect\control> .\create-vmfleet.ps1 -basevhd "C:\ClusterStorage\Collect\GoldVMFleet.vhdx" -VMs 40 -adminpass: [redacted] -connectuser administrator -connectpass: [redacted]
convert C:\ClusterStorage\Collect\GoldVMFleet.vhdx to fixed via C:\ClusterStorage\Collect\Temp-GoldVMFleet.vhdx

Name          SwitchType NetAdapterInterfaceDescription PSComputerName
-----
Internal Internal          GOWS2DTEST09
Internal Internal          GOWS2DTEST10

ifIndex      : 56
PSComputerName : GOWS2DTEST10
RunspaceId   : 216cec8b-436e-43c6-905f-5319951b2e79
Caption      :
Description  :
ElementName  :
InstanceID   :
CommunicationStatus :
DetailedStatus :
HealthState  :
InstallDate  :
Name         : ;@C8<>>8;8;55?@55;55;
OperatingStatus :
OperationalStatus :
PrimaryStatus :
Status       :
StatusDescriptions :
AvailableRequestedStates :
EnabledDefault : 2
EnabledState :
OtherEnabledState :
RequestedState : 12
TimeOfLastStateChange :
TransitioningToState : 12
CreationClassName :
SystemCreationClassName :
SystemName   :
NameFormat   :
OtherTypeDescription :
ProtocolIFType : 4096
ProtocolType :
Address      :
AddressOrigin : 0
AddressType  :
IPv4Address  : 169.254.1.1
IPv6Address  :
IPVersionSupport :
PrefixLength : 16
SubnetMask   :
AddressFamily : 2
AddressState : 1
InterfaceAlias : vEthernet (Internal)
InterfaceIndex : 56
IPAddress    : 169.254.1.1
PreferredLifetime : 10675199.02:48:05.4775807
PrefixOrigin : 1
SkipAsSource : False
Store        : 1
SuffixOrigin : 1
Type         : 1
ValidLifetime : 10675199.02:48:05.4775807

ifIndex      : 56
PSComputerName : GOWS2DTEST09
RunspaceId   : a04e5833-fa7a-464c-a44e-49b5ecb1dbbc
Caption      :
Description  :
ElementName  :
InstanceID   :
CommunicationStatus :
DetailedStatus :
HealthState  :
InstallDate  :
Name         : ;@C8<>>8;8;55?@55;55;
OperatingStatus :
OperationalStatus :
PrimaryStatus :
Status       :
StatusDescriptions :
AvailableRequestedStates :
EnabledDefault : 2
EnabledState :
OtherEnabledState :
RequestedState : 12
TimeOfLastStateChange :
TransitioningToState : 12
CreationClassName :
SystemCreationClassName :
SystemName   :
NameFormat   :
```

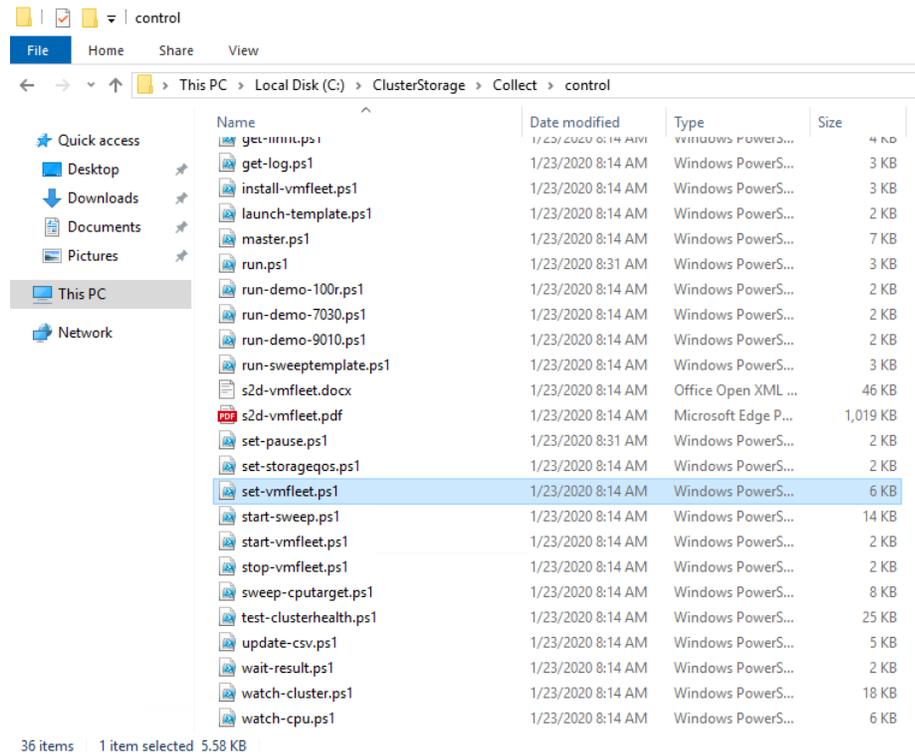
Please set all VMs to 2 x vCPU and 4GB static memory with below command.

`Set-VMfleet.ps1 -ProcessorCount 2 -MemoryStartupBytes 4GB -MemoryMaximumBytes 4GB -MemoryMinimumBytes 4GB`

If VM is running, the script will not work as below. Pls stop all VMs. You will apply the setting after that as below.

```
PS C:\ClusterStorage\Collect\control> Set-VMfleet.ps1 -ProcessorCount 2 -MemoryStartupBytes 4GB -MemoryMaximumBytes 4GB -MemoryMinimumBytes 4GB
Cannot alter VM sizing on running VMs ( )
PS C:\ClusterStorage\Collect\control> Set-VMfleet.ps1 -ProcessorCount 2 -MemoryStartupBytes 4GB -MemoryMaximumBytes 4GB -MemoryMinimumBytes 4GB
PS C:\ClusterStorage\Collect\control>
```

The script is located at below folder.



You can destroy all VM also. If needed, please use the command below.

```
Administrator: Windows PowerShell
PS C:\ClusterStorage\Collect\control> .\destroy-vmfleet.ps1
Destroying VM Fleet
Removing VM ClusterGroups
Removing ClusterGroup for vm-base-GOWS2DTEST09-1

Removing ClusterGroup for vm-base-GOWS2DTEST09-2
Removing ClusterGroup for vm-base-GOWS2DTEST10-1
Removing ClusterGroup for vm-base-GOWS2DTEST10-2
Removing VMs
Removing VM for vm-base-GOWS2DTEST10-1 @ GOWS2DTEST10
Removing VM for vm-base-GOWS2DTEST10-2 @ GOWS2DTEST10
Removing Internal VMSwitch
Removing VM for vm-base-GOWS2DTEST09-1 @ GOWS2DTEST09
Removing VM for vm-base-GOWS2DTEST09-2 @ GOWS2DTEST09
Removing Internal VMSwitch
Removing CSV content for VMs
Removing CSV content for vm-base-GOWS2DTEST09-1 @ C:\ClusterStorage\GOWS2DTEST09\vm-base-GOWS2DTEST09-1
Removing CSV content for vm-base-GOWS2DTEST09-2 @ C:\ClusterStorage\GOWS2DTEST09\vm-base-GOWS2DTEST09-2
Removing CSV content for vm-base-GOWS2DTEST10-1 @ C:\ClusterStorage\GOWS2DTEST10\vm-base-GOWS2DTEST10-1
Removing CSV content for vm-base-GOWS2DTEST10-2 @ C:\ClusterStorage\GOWS2DTEST10\vm-base-GOWS2DTEST10-2
Name                OwnerNode           State
----                -
vm-base-GOWS2DTEST09-1 GOWS2DTEST09 Offline
vm-base-GOWS2DTEST09-2 GOWS2DTEST09 Offline
vm-base-GOWS2DTEST10-1 GOWS2DTEST10 Offline
vm-base-GOWS2DTEST10-2 GOWS2DTEST10 Offline
PS C:\ClusterStorage\Collect\control>
```


Pls customize below PowerShell script (watch-cluster.ps1) to monitor actual performance. The script is located same with set-vmfleet.ps1.

```
watch-cluster - Notepad
File Edit Format View Help
<#
DISKSPD - VM Fleet

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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
#>

param(
    $Cluster = ".",
    $SampleInterval = 2,
    [ValidateSet("CSV FS", "SSB Cache", "SBL", "SBL Local", "SBL Remote", "SBL*", "S2D BW", "Hyper-V LCPU", "SMB SRV", "SMB Transport", "**")]
    [string[]] $Sets = "CSV FS",
    $Log = $null
)

if ($null -ne $log) {
    del -Force $log -ErrorAction SilentlyContinue
}
```

Please change the point to “**”.

```
watch-cluster-yema - Notepad
File Edit Format View Help
<#
DISKSPD - VM Fleet

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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
#>

param(
    $Cluster = ".",
    $SampleInterval = 2,
    [ValidateSet("CSV FS", "SSB Cache", "SBL", "SBL Local", "SBL Remote", "SBL*", "S2D BW", "Hyper-V LCPU", "SMB SRV", "SMB Transport", "**")]
    [string[]] $Sets = "**",
    $Log = $null
)

if ($null -ne $log) {
    del -Force $log -ErrorAction SilentlyContinue
}
```

Please check how many VMs are running on your cluster with below command.

```
Administrator: Windows PowerShell

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

PS C:\Windows\system32> cd C:\ClusterStorage\Collect\control\
PS C:\ClusterStorage\Collect\control> .\check-vmfleet.ps1

State Pivot

Count Name
-----
    80 Online

Host Pivot

Count Name
-----
    40 GOWS2DTEST09, Online
    40 GOWS2DTEST10, Online

Group Pivot

Count Name
-----
    80 base, Online

IOPS Pivot

Count IOPS
-----
    80 < 10

PS C:\ClusterStorage\Collect\control> █
```

Please run Start-Sweep.ps1 for testing. You can set some parameters.

- b: list of buffer sizes (KiB)
- t: list of thread counts
- o: list of outstanding IO counts
- w: list of write ratios
- warm: duration of pre-measurement warmup (seconds)
- d: duration of measured interval (seconds)
- p: list of patterns (random: r, sequential: s, sequential interlocked: si)
- cool: duration of post-measurement cooldown (seconds)

The following is for 4KB IO Block, 100% Random (100% Read / 0% Write)

```
PS C:\ClusterStorage\Collect\control> .\Start-Sweep.ps1 -b 4 -t 2 -o 16 -w 0 -d 600
```

The following is for 4KB IO Block, 100% Random (67% Read / 33% Write)

```
PS C:\ClusterStorage\Collect\control> .\Start-Sweep.ps1 -b 4 -t 2 -o 16 -w 33 -d 600
---
RUN SPEC @ 4/23/2020 8:47:17 AM
o = 16
d = 600
AddSpec = base
p = r
b = 4
t = 2
w = 33
Cool = 60
Warm = 60
iops = $null
Generating new runfile @ 4/23/2020 8:47:17 AM
Pause not in force
START Go Epoch: 1 @ 4/23/2020 8:47:32 AM
```

You can see the actual performance as below.

The screenshot displays the Windows Performance Monitor and Task Manager. The Performance Monitor window shows the 'PhysicalDisk' counter for '%% Disk Read Time' and '%% Disk Write Time' for the 'G:\GWS2\TEST9' drive. The Task Manager window shows the CPU usage for the 'Intel(R) Xeon(R) Gold 6248 CPU @ 2.50GHz' at 76% utilization, with a speed of 3.18 GHz. The Resource Monitor window shows the 'SMB Direct Connection' and 'SMB Server' counters for the 'G:\GWS2\TEST9' drive, including metrics for Bytes Read/Write, IOPS, and Latency. The Performance Monitor also shows the 'Hyper-V CPU' counter for the 'G:\GWS2\TEST9' drive, including metrics for Logical Processors, HyperVisors, and Root Total Queue.

I prefer to check raw data with the performance monitor also. The filter below may be a good to monitor it.

“PhysicalDisk”

“RDMA Activity”
 “SMB Direct Connection”

You can check the performance on WAC also.

The image shows two screenshots. The left screenshot is Windows Performance Monitor, displaying CPU usage at 77% (3.18 GHz) and a detailed table for RDMA Activity. The right screenshot is Windows Admin Center, showing the 'Volumes' page for 'gos2dcluster5.micron.com' with performance graphs for IOPS (462k total, 4.23ms average) and Throughput (1.76 GB/s total).

Category	Value
RDMA Accepted Connections	216,000
RDMA Active Connections	0,000
RDMA Completion Queue Errors	0,000
RDMA Connection Errors	0,000
RDMA Inbound Bytes/Sec	486,614,973,144
RDMA Inbound Connections	30,000
RDMA Outbound Bytes/Sec	848,955,745
RDMA Outbound Connections	0,000

When the script is completed, it will install a log file in the below location.

<File://C:¥ClusterStorage¥Collect¥control¥result>

The screenshot shows a File Explorer window with the path 'PC > Local Disk (C:) > ClusterStorage > Collect > control > result'. The file list contains numerous log files with names like 'result-b42o16w33pr-base-vm-base-GOWS2DTEST10-31+vm-base-GOWS2DTEST10-31' and 'result-b48o32w0pr-base-vm-base-GOWS2DTEST09-1+vm-base-GOWS2DTEST09-1'.

If you would like to do the same test again, you have to delete the previous results. I always copy them to another location before deleting them.

If you would like to confirm the NIC power, I recommend using the below tool. This is created by Microsoft. I tested my own NIC to confirm it had enough power.

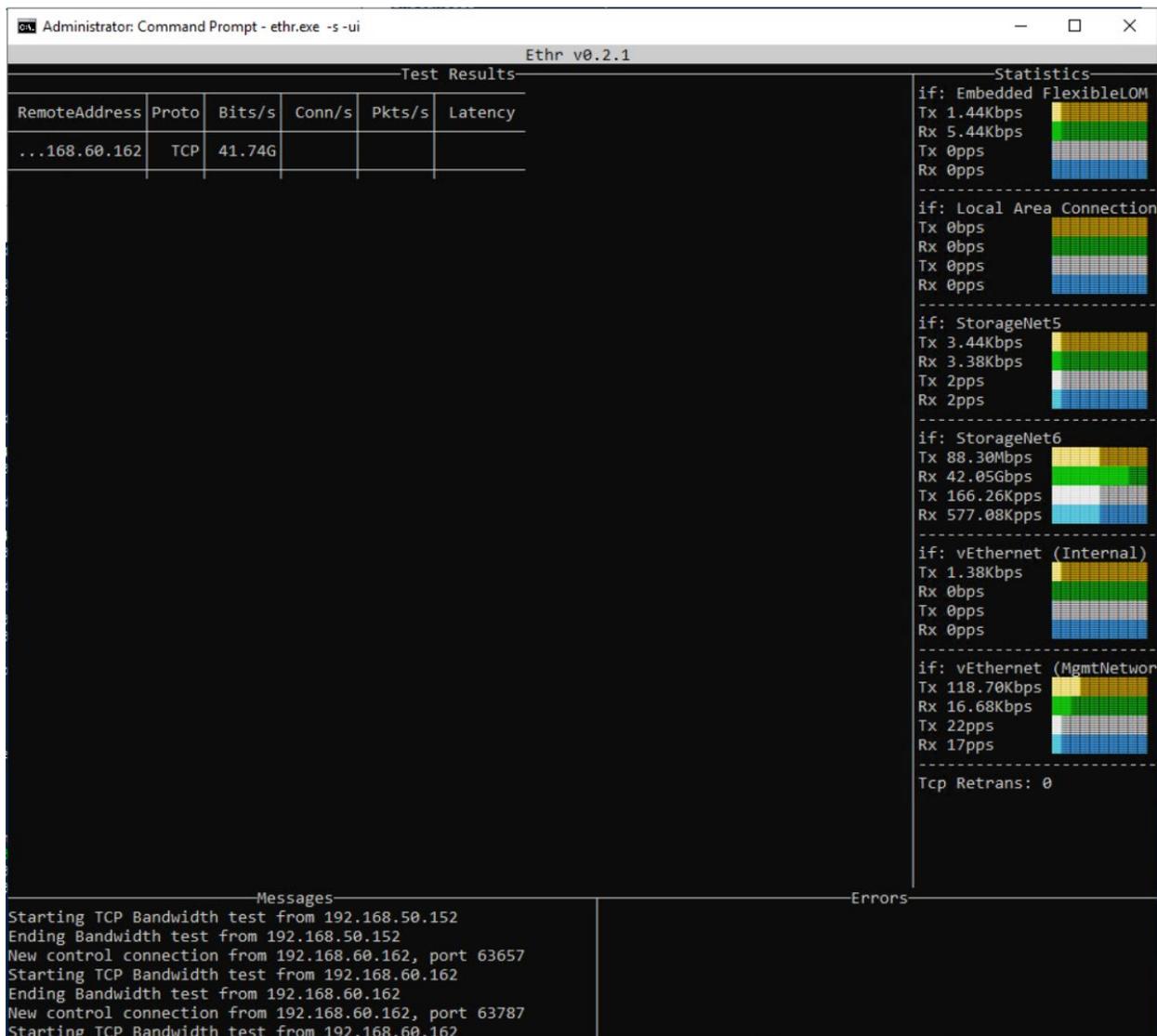
ethr.exe

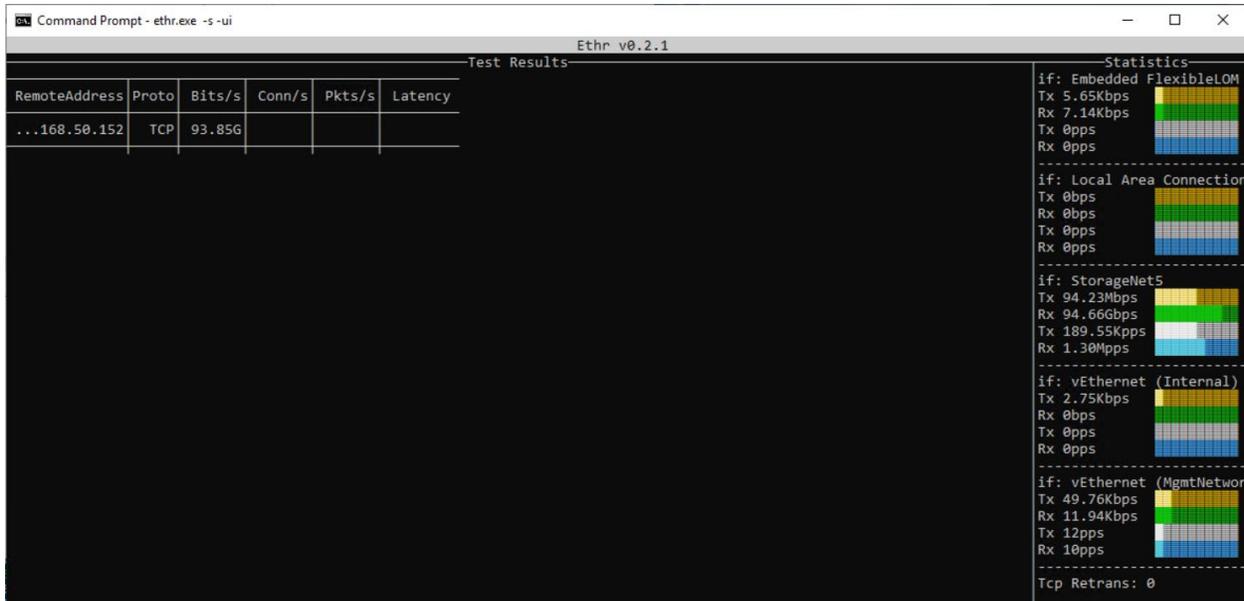
You can download it from below. <https://github.com/microsoft/ethr>

Please extract zip file to <file:///C:/temp>.

Please run below command on your Node 1.

```
ethr.exe -s -ui
```





Please run the command below on your Node 2. If you point the IP address of Node 1 with the below reference command. You can see the network performance.

- `ethr.exe -c <server ip> -n 8`
- `ethr.exe -c <server ip> -n 16`
- `ethr.exe -c <server ip> -n 32`
- `ethr.exe -c <server ip> -n 64`
- `ethr.exe -c <server ip> -n 128`
- `ethr.exe -c 192.168.10.111 -n 128`

the following is optional for the client side.

Option	Description
<code>-c <server IP></code>	Client mode. Destination server IP address
<code>-t <b c p l ></code>	Test items (default is bandwidth) b: bandwidth c: connections/s p: packets/s l: latency
<code>-p <tcp udp http https icmp></code>	Protocol (default is TCP)
<code>-n <number></code>	Number of Session/thread
<code>-l <number></code>	Buffer size
<code>-l <number></code>	Number of repeats for latency test

The log will be stored with ethrs.log. If you want, please check it. If you want to know more, please try to use -h to access help. Or visit download page for more detail.

```
C:\S2D12temp>cd ethr_windows
C:\S2D12temp\ethr_windows>ethr.exe -c 192.168.10.111 -n 128
dial tcp 192.168.10.111:8888: connectex: A connection attempt failed because the connected party did not properly respond after a period of time, or established connection failed because connected host has failed to respond.
```

```
Command Prompt
C:\TEMP\ethr_windows>ethr.exe -c 192.168.50.151 -n 4
Connecting to host [192.168.50.151], port 9999
[384] local 192.168.50.152 port 55156 connected to 192.168.50.151 port 9999
[396] local 192.168.50.152 port 55159 connected to 192.168.50.151 port 9999
[392] local 192.168.50.152 port 55157 connected to 192.168.50.151 port 9999
[404] local 192.168.50.152 port 55158 connected to 192.168.50.151 port 9999
-----
[ ID] Protocol Interval Bits/s
[384] TCP 000-001 sec 5.66G
[396] TCP 000-001 sec 6.94G
[392] TCP 000-001 sec 10.17G
[404] TCP 000-001 sec 9G
[SUM] TCP 000-001 sec 31.77G
-----
[384] TCP 001-002 sec 8.04G
[396] TCP 001-002 sec 8.84G
[392] TCP 001-002 sec 8.31G
[404] TCP 001-002 sec 8.28G
[SUM] TCP 001-002 sec 33.47G
-----
[384] TCP 002-003 sec 9.38G
[396] TCP 002-003 sec 5.34G
[392] TCP 002-003 sec 7.14G
[404] TCP 002-003 sec 11.04G
[SUM] TCP 002-003 sec 32.90G
-----
[384] TCP 003-004 sec 9.33G
[396] TCP 003-004 sec 7.24G
[392] TCP 003-004 sec 7.67G
[404] TCP 003-004 sec 9.82G
[SUM] TCP 003-004 sec 34.06G
-----
[384] TCP 004-005 sec 6.39G
[396] TCP 004-005 sec 9.98G
[392] TCP 004-005 sec 9.71G
[404] TCP 004-005 sec 6.10G
[SUM] TCP 004-005 sec 32.18G
-----
[384] TCP 005-006 sec 7.49G
[396] TCP 005-006 sec 7.18G
[392] TCP 005-006 sec 9.36G
[404] TCP 005-006 sec 9.78G
[SUM] TCP 005-006 sec 33.80G
-----
[384] TCP 006-007 sec 8.44G
[396] TCP 006-007 sec 7.96G
[392] TCP 006-007 sec 8.55G
[404] TCP 006-007 sec 9.48G
[SUM] TCP 006-007 sec 34.44G
-----
[384] TCP 007-008 sec 7.82G
[396] TCP 007-008 sec 6.91G
[392] TCP 007-008 sec 8.95G
[404] TCP 007-008 sec 10.15G
[SUM] TCP 007-008 sec 33.83G
-----
[384] TCP 008-009 sec 9.01G
[396] TCP 008-009 sec 8.29G
[392] TCP 008-009 sec 7.86G
[404] TCP 008-009 sec 8.91G
[SUM] TCP 008-009 sec 34.06G
-----
[384] TCP 009-010 sec 7.33G
[396] TCP 009-010 sec 8.19G
[392] TCP 009-010 sec 9.67G
[404] TCP 009-010 sec 8.97G
[SUM] TCP 009-010 sec 34.16G
-----
Ethr done, duration: 10s.
C:\TEMP\ethr_windows>
```

You can use the network performance monitor tool with VM Fleet and performance monitor as below.

The screenshot displays a Windows system performance dashboard. On the left, the Performance Monitor shows various system metrics for 'WGW02TEST11', including CPU usage at 56%, memory usage at 20%, and disk I/O statistics. The Task Manager window in the center shows the CPU tab with a detailed view of logical processors and system information, such as 174 processes and 3919 threads. On the right, a Windows PowerShell terminal window shows the execution of a script named 'PS C:\ClusterStorage\Collect\control' which appears to be managing storage or network configurations. Below the Task Manager, a 'Statistics' window provides a detailed view of network connections, listing various protocols like iSCSI, NFS, and SMB, along with their respective read and write rates and connection counts.

Troubleshoot:

If you cannot run Powershell script. Please try to do the below.

Enable-PSRemoting -Force

```
Administrator: Windows PowerShell
Windows PowerShell
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Loading personal and system profiles took 1460ms.
PS C:\WINDOWS\system32> Enable-PSRemoting -Force
WinRM is already set up to receive requests on this computer.
WinRM is already set up for remote management on this computer.
■
```

Winrm s winrm/config/client "@{TrustedHosts="host name"}"

```
PS C:\ClusterStorage\Collect\control> Enable-PSRemoting -Force
PS C:\ClusterStorage\Collect\control> .\stop-vmfleet.ps1
(GOWS2DTEST09) Connecting to remote server GOWS2DTEST09 failed with the following error message : Access is denied. For more information, see the about_Remote_Troubleshooting Help
topic.
+ CategoryInfo          : OpenError: (GOWS2DTEST09:String) [], PSRemotingTransportException
+ FullyQualifiedErrorId : AccessDenied,PSSessionStateBroken
PS C:\ClusterStorage\Collect\control> get-service winrm
Status Name           DisplayName
-----
Running winrm      Windows Remote Management (WS-Manag...

PS C:\ClusterStorage\Collect\control> winrm s winrm/config/client '@{TrustedHosts="GOWS2DTEST09"}'
Client
NetworkDelays = 5000
URLPrefix = wsman
AllowUnencrypted = false
Auth
Basic = true
Digest = true
Kerberos = true
Negotiate = true
Certificate = true
CredSSP = false
DefaultPorts
HTTP = 5985
HTTPS = 5986
TrustedHosts = GOWS2DTEST09
PS C:\ClusterStorage\Collect\control> ■
```

Set-NetFirewallRule -Name WINRM-HTTP-In-TCP -RemoteAddress Any

```
Administrator: Windows PowerShell
Windows PowerShell
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Loading personal and system profiles took 1913ms.
PS C:\WINDOWS\system32> Set-NetFirewallRule -Name WINRM-HTTP-In-TCP -RemoteAddress Any
PS C:\WINDOWS\system32> ■
```

Afterword

Thank you for downloading this installation guide and reference architecture. Yes, you can install Azure Stack HCI by yourself. As you may know, Microsoft has an easier way than this to set up Azure Stack HCI. But Micron IT offers these kinds of detailed installation manuals to help build an understanding of the solution and benefits of Micron flash storage and memory. This document does not cover how to promote Azure Stack HCI to enterprise level in your company. To do that, it is better to access and review the instructions below:

1. Major operation manual
2. Server maintenance include cluster maintenance
3. MS-Patching
4. Monitoring
5. Major troubleshooting
6. VM backup
7. File/folder backup
8. Logging
9. Security
10. Capacity management
11. Performance forecast
12. Scale up
13. Scale out
14. Training for internal system administrators
15. Convert existing VM to Azure Stack HCI for VM tiering
16. Collaboration with Azure Cloud Server platform
17. Collaboration with Azure Services

Advanced points:

18. Azure Stack HCI OS for branch office [small office]
19. Windows Admin Center with server/storage vendor plugin tool
20. Azure stack HCI community [external] for getting the latest info/trouble
21. Collaboration with existing system at your company
 - A) BI report system
 - B) Support ticket management system and more

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Benchmark software and workloads used in performance tests may have been optimized for performance on specified components and have been documented here where possible. Performance tests, such as HClbench, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

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