

Citrix VDI Guide for Intel[®] Data Center GPU Flex Series

Setup Reference Guide

March 2024

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intel. *Revision History*

Revision Number	Description	Date
1.0	Initial release of the document.	March 2024



1 Introduction

The purpose of this document is to provide Citrix* VDI (Virtual Desktop Infrastructure) setup for Intel[®] Data Center GPU Flex Series on Intel[®] Xeon[®] platforms, BIOS, OS, drivers which are required to enable VDI.

1.1 Terminology

The following acronyms and terms are used in this document.

Table 1-1. Terms and Their Definitions

Term	Description
ATSM	Arctic Sound-M graphics cards
BDF	Bus Device Function
BIOS	Basic input-output system
GPU	Graphics Processing Unit
Intel GVT	Intel Graphics Virtualization Technology
INTDCGPU	Intel Data Cetner GPU
IRC	Intel Resource Center
MMIO	Input-Output Memory Management Unit
PCIe	Peripheral Component Interconnect Express*
PECI	Platform Environment Control Interface
SRI0-V	Single Root I/O Virtualization

2.1 Host BIOS Configuration

Following are the recommended BIOS settings for the Intel Data Center GPU Flex Series card:

- 1. Memory Mapped I/O Size: Set to 1024G or 2048G** if supported.
- 2. MMIO High Base: Set to the maximum value supported (36T-56T depending on the system)
- 3. Memory Mapped I/O above 4 GB: Set to Enabled
- 4. Advanced \rightarrow Processor Configuration \rightarrow Intel® Virtualization Technology: Set to Enabled (if using GVT-D pass-thru or SRIOV virtualization)
- 5. Intel® Virtualization Technology for Directed IO: Set to Enabled (if using Intel® Graphics Virtualization Technology (Intel® GVT) pass-thru or SRIOV virtualization)
- 6. SRIOV Support: Set to Enabled (if using SRIOV virtualization) or disabled otherwise.
- 7. System cooling: Set to maximum/performance mode.

For the Intel M50 CYP Server, the settings may be found in the BIOS configuration under the following paths:

- 1. Advanced \rightarrow PCI Configuration \rightarrow Memory Mapped I/O Size: Set to 1024G.
- 2. Advanced \rightarrow PCI Configuration \rightarrow MMIO High Base: Set to 56T.
- 3. Advanced \rightarrow PCI Configuration \rightarrow Memory Mapped I/O above 4 GB: Set to Enabled
- 4. Advanced \rightarrow Integrated IO Configuration \rightarrow Intel® VT for Directed IO: Set to Enabled
- 5. Advanced \rightarrow PCI Configuration \rightarrow SRIOV Support: Set to Enabled
- 6. Advanced \rightarrow System Acoustic and Performance Configuration \rightarrow Performance
- 7. Advanced \rightarrow Processor Configuration \rightarrow Intel Virtualization Technology: Set to Enabled

Note that the BIOS configuration may vary depending on the host system. Refer to the host system vendor's BIOS configuration guide for specific instructions.

2.2 OS Setup

Download the latest ESXI OS(8.0.2) build which supports $Intel^{(8)}$ Data Center GPU Flex Series from VMware website.



For ESXi installation refer the set-up guide: <u>https://docs.vmware.com/en/VMware-vSphere/8.0/vsphere-esxi-801-installation-setup-guide.pdf</u>

After ESXI is successfully installed, note down the IP address of the server.

Figure 2-1. Screenshot with IP Address

T	nanage this host, go to:	
h	tps://10.105.174.43/ (DHCP)	

2.3 Enable SSH

2.3.1 Enable SSH through UEFI

Enable SSH on ESXi via DCUI (Direct Console User Interface)1. Log in to the ESXi host console directly or through a remote console session.



Figure 2-2. Screenshot with Authentication

nin name and passwor	
ind.intel.com.	d for
S Default)	
oot]
<enter> OK</enter>	KEsc> Cance
	S Default) Dot KEnter> OK

2. Navigate to the "Troubleshooting Options" menu.

Figure 2-3. Screenshot with Troubleshooting Options

System Custonization	Troubleshooting Options
Configure Password Configure Lockdown Mode	То view various troubleshooting mode options like Enable ESXi Shell, Enable SSH and Restart Agents.
Configure Management Network Restart Management Network Test Management Network Network Restore Options	
Configure Keyboard Troubleshooting Options	
View System Logs	
View Support Information	
Reset System Configuration	

3. Within the Troubleshooting Options menu, locate the option for SSH and select it.

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Figure 2-4. Screenshot with SSH Options menu

Troubleshooting Mode Options	SSH Support
Disable ESXi Shell	SSH is Enabled
Uisable SSH Modify ESXi Shell and SSH timeouts Modify DCUI idle timeout Restart Management Agents	Change current state of SSH

- 4. Check SSH status, if it is disabled, click enter to enable.
- 5. After enabling SSH, confirm your selection and save the changes.
- 6. Exit the DCUI interface.

2.3.2 Enable SSH through ESXi Host Web Client

To establish a connection to the ESXi host, SSH and ESXi Shell must be enabled. Follow these steps:

- 1. Open the ESXi Host WebClient.
- 2. Click on the 'Host' tab and then select the 'Actions' button.
- 3. Next, click on 'Services.' A dropdown menu will appear, allowing you
- to enable SSH and ESXi Shell.

S Navigator 《	The live-gta-imageloader.iind.inte	Lcom				
Montor Winto_VMI Montor Montor Montor More VMI	Get vCenter Server	*@ Create/Register VM 0 Shut down 2 Beboot C ageloader.iind.intel.com 8.0.0 Normal (not connected to any vCenter Server) 0.19 days	Refresh	ions st ate/Register VM t down	CPU UNHD 366 MMY MEMORY USED 5318 C0 STORAGE USED 4 TB	FREE 194.5 GHU ON CARRACITY 195 50 GHU PREE 75 50 GHU CARACITY 107 7 00 FREE 206 37 00 REE 206 37 00 CARACITY 109 TB
Storage 1 Setworking 1	ESXI Shell for the host i	Ive-gta-imageloader.lind.intel.com has been mab 📮 Disable 550 sho	ell (SSH)	n maintenan Manage	ervices on this host	*
	The ESXI shell is enable SSH is enabled on this i Hardware Manufacturer	d on this host. You should disable the shell unless it is necessary for administrative put	rposes. • • Configuration	missions erate support bundle SSH for Chrome		× ×
	Model	WHITLEY	vSohere HA state		(VMware, inc.) Not configured	
	> CPU CPU B Memory	48 CPUs x intel(R) Xeon(R) Gold 6336Y CPU @ 2.400Hz 127.7 G8	> vMotion		Supported	
	Recent tasks					
	Task	✓ Target ✓ Initiator ✓ Ourued	~ Starte	d v Re	sult *	✓ Completed ▼

Figure 2-5. Screenshot with Web Client



2.4 Installing Intel Data Center Graphics Driver for VMware ESXi Host

- Download the ESXI PF driver and Idcgputools package from Intel public website. <u>https://www.intel.com/content/www/us/en/download/786751/intel-data-</u> center-graphics-driver-for-vmware-esxi.html
- 2. Open a secure shell (SSH) connection to the target ESXi host (SSH needs to be enabled to perform this operation).
- 3. Put the system in maintenance mode.

esxcli system maintenance Mode set -e=1

1. Copy the driver component package to the ESXi server '/tmp' folder.

Here is an example of using the Linux* `scp` utility to copy the file from the downloaded location to the remote/target ESXi server located at 10.10.10.10:

scp *-idcgpu-*.zip root@10.10.10.10:/tmp

2. Copy the esxcli plugin component to the ESXi server.

scp *-idcgputools-*.zip root@10.10.10.10:/tmp

3. Install the idcgpu component.

esxcli software component apply --no-sig-check -d /tmp/*-Intelidcgpu-*.zip

Note: This step can take some time (30+ seconds).

4. Install the idcgputools component.

esxcli software component apply --no-sig-check -d /tmp/*-Intelidcgputools-*.zip

5. Reboot the system to complete driver installation:

reboot

6. If the Intel® Data Center Graphics Driver loaded without errors, the idcgpu module is present in the list of system modules:

esxcfg-module -l | grep idcgpu idcgpu 0 4868



- 7. If the idcgputools component is installed correctly, then 'intdcgpu' namespace is present when `esxcli` is run.
- 8. Exit maintenance mode.

esxcli system maintenanceMode set -e=0

2.5 Uninstalling Driver

- 1. Open an SSH connection to the target ESXi host.
- 2. Shut down all running VMs.
- 3. Uninstall the idcgputools component.

esxcli software component remove -n Intel-idcgputools

4. Uninstall the idcgpu component.

esxcli software component remove -n Intel-idcgpu

5. Reboot the system to complete the removal process.

reboot

2.6 Profile Map

The following table defines the available profiles for Flex 140 and Flex 170 cards.

The following are the available profiles for Intel Data Center GPU Flex 140 and Flex 170.

For more details refer to the Intel Datacenter GPU Series for VDI document solution: <u>https://www.intel.com/content/www/us/en/products/docs/discrete-gpus/data-center-gpu/flex-series/vdi-solution-brief.html</u>

Table 2-1. FLEX 140 Cards Supported Profiles

		VFs	/SOC	Memory p	er VF(MB)
Profile Name	Profile ID	Min	Max	ECC On	ECC off
ATSM75_V1	2	1	1	4198	5120
ATSM75_V3	3	1	3	1398	1706
ATSM75_V6	4	1	6	698	853



Illustration: with 1x Flex 140 card which has two SOCs, up to 12 VFs are supported using ATSM75-V6 Profile,

Profile Name	Profile ID	VFs	/SOC	Memory pe	er VF (MBs)
		Min	Max	ECC On	ECC Off
ATSM150_V1	2	1	1	12902	15360
ATSM150_V2	3	1	2	6450	7680
ATSM150_V4	4	1	4	3224	3840
ATSM150_V5	5	1	5	2580	3072
ATSM150_V8	6	1	3	1612	1920
ATSM150_V16	7	1	16	806	960

Table 2-2. FLEX 170 Cards Supported Profiles

Illustration: with 1x Flex 170 card which has 1 SOCs, up to 16 VFs are supported using ATSM150_V16 Profile,

2.7 ECC configuration

ECC on provides additional data integrity protection by detecting and correcting errors in GPU memory, while ECC off may increase the GPU performance.

- Enable maintenance mode for system updates: esxcli system maintenanceMode set -e=1
- 2. Display the list of Flex 140 devices: esxcli intdcgpu devices list

For illustration purposes, let's assume the following Flex 140 devices: - Intel(R) Data Center GPU Flex 140 (56c1) with SBDF "0000:51:00.0" (20736) with 0 VFs

- Intel(R) Data Center GPU Flex 140 (56c1) with SBDF "0000:56:00.0" (46848) with 0 VFs

3. Verify ECC status on each GPU:

-d: The bus ID of the PCI device (e.g., 0000:51:00.0) (required) -s: The ECC state to be set on a device. Host needs a reboot for this setting to take effect (required)

- -s=0: Disable ECC on
- -s=1: Enable ECC on

esxcli intdcgpu configuration boot ecc get -d 0000:51:00.0 esxcli intdcgpu configuration boot ecc get -d 0000:56:00.0



4. Disable ECC on each Flex GPU:

esxcli intdcgpu configuration boot ecc set -d 0000:51:00.0 -s=0 esxcli intdcgpu configuration boot ecc set -d 0000:56:00.0 -s=0

 Enable ECC on each Flex GPU esxcli intdcgpu configuration boot ecc set -d 0000:51:00.0 -s=1 esxcli intdcgpu configuration boot ecc set -d 0000:56:00.0 -s=1

6. ECC state changes require a system reboot. Perform a system reboot. *reboot*

Figure 2-6. Screenshot with Authentication

```
[root@WIN-PB8KS0126H4:~] esxcli system maintenanceMode set -e=1
Maintenance mode is already enabled.
[root@WIN-PB8KS0126H4:~] esxcli intdcgpu devices list
Supported devices:
1: Intel(R) Data Center GPU Flex 140 (56c1) with SBDF "0000:51:00.0" (20736) with 6 VFs
2: Intel(R) Data Center GPU Flex 140 (56c1) with SBDF "0000:56:00.0" (22016) with 0 VFs
[root@WIN-PB8KS0126H4:~] esxcli intdcgpu configuration boot ecc get -d 0000:51:00.0
Current ECC State: 1, Pending ECC State: 1
[root@WIN-PB8KS0126H4:~] esxcli intdcgpu configuration boot ecc get -d 0000:56:00.0
Current ECC State: 1, Pending ECC State: 1
[root@WIN-PB8KS0126H4:~] esxcli intdcgpu configuration boot ecc set -d 0000:56:00.0 -s=0
Current ECC State: 1, Pending ECC State: 0
Changes to ECC state requires a reboot
[root@WIN-PB8KS0I26H4:~] reboot
```

2.8 **Profile Configuration**

Profile configuration for the Flex GPU can be accomplished through two methods.

2.8.1 **Profile Configuration via Module Parameters**

- List Available Module Parameters: exclaim system module parameters list -m idcgpu
- 8. Clear Existing Module Parameters: esxcli system module parameters clear -m idcgpu
- Set Parameters Using Command: esxcli system module parameters set -m idcgpu -a -p "<param_name>=<param_value(s)>"

10. List Devices:

Each device is identified with an ID for parameter targeting. Example:



esxcli intdcgpu devices list 1: Intel Data Center GPU Flex 140 (56c1) with SBDF "0000:46:00.0" (17920) with 1 VFs 2: Intel Data Center GPU Flex 140 (56c1) with SBDF "0000:4a:00.0" (18944) with 0 VFs

To configure devices via module parameters:

esxcli system module parameters set -m idcgpu -a -p "ids=17920,18944"

esxcli system module parameters set -m idcgpu -a -p "profile=1,1"

11. Reload Driver:

Execute the following commands to apply changes immediately:

esxcfg-module -u idcgpu # unloads module if already running.
kill -HUP \$(cat /var/run/vmware/vmkdevmgr.pid)

Figure 2-7. Screenshot with Module Parameter





2.8.2 Profile Configuration Using `intdcgpu`

To configure profiles using the Intel `intdcgpu` tool, follow these steps. Please note that configurations made using this method are not persistent and will be removed upon server reboot or idcgpu reload:

- 1. Get Device List: esxcli intdcgpu devices list
- Specify Desired Profile: esxcli intdcgpu profiles set -d <device id> -p <profile number> profile number: specified in Section 2.5 Profile Map Example : esxcli intdcgpu profiles set -d 0000:bc:00.0 -p 2
- Verify Selected Profile: esxcli intdcgpu profiles get -d <device id> Example : esxcli intdcgpu profiles get -d 0000:bc:00.0

These commands allow you to list the available devices, set a desired profile for a specific device, and verify the selected profile respectively.

Figure 2-8. Screenshot with intdcgpu



intel. *3 Enabling SR-IOV VFs for VMware ESXi Host*

3.1 Enabling SR-IOV

- 1. Access ESXi Host UI:
 - Log in to the ESXi Host UI.
 - Navigate to 'Host' \rightarrow 'Manage' \rightarrow 'Hardware' tab.

Figure 3-1. VMWare ESXi Window

* 🔄 Host	System Hardware	Licensing Packages Services Security & users		
Manage				
Monitor	PCI Devices	Toggle passthrough / Configure SR-IOV / Hardware label 📓 Reboot host C Refresh		(Q, b3 ×
🖞 Virtual Machines 🛛 🚺	Power Management	. Address Secription	SR-IOV	Passthrough 🔗 Hardware Label 🔗
* 🔂 Win10_VM1		0000/b2/00.6 Intel Comprision Data Center CPU Elay 170	Not canable	Activa
Monitor		0000.b3.00.5 Intel Corporation Data Center GPU Flex 170	Not capable	Active
More VMs		0000 h3:00 4 Intel Corporation Data Center GPU Flex 170	Not capable	Active
Storage		0000 b3 00 3 Intel Corporation Data Center GPU Flex 170	Not capable	Active
Metworking		0000:b3:00.2 Intel Corporation Data Center GPU Flex 170	Not capable	Active
		0000/b3:00.1 Intel Corporation Data Center GPU Flex 170	Not capable	Active
		0000/b3.00.0 Intel Corporation Data Center GPU Flex 170	Active	Disabled
		Data Center GPU Filex 170 ID 000000000 Vendor Name Devce ID 0.656.0 Class ID Vendor ID 0.680.6 Stotewice ID Vendor ID 0.680.6 Stotewice ID Bis 0.63 Stot	Intel Corporation 0x380 0x4905 0x4086 0x0	
	🕄 Recent tasks			
	Task	v Target v Initiator v Queued v Started	✓ Result ▲	✓ Completed ▼
	Task	✓ Target ✓ Initiator ✓ Queued ✓ Started	✓ Result ▲	✓ Completed ▼

- 2. Configure SR-IOV:
 - a. Click on 'Configure SR-IOV'.
 - b. A small window will pop up.
 - c. Specify the number of VFs to be created, ensuring a 1:1 mapping between VFs and VMs.
 - d. Click 'Save' and refresh the ESXi Host Page.

intel.

'ower Management	C. Address	Description			SR-IOV	 Passthrough 	😦 Hai
	O 0000:b3:00.6	Intel Corporatio	on Data Center GPU Flex 170		Not capable	Active	
	O.0000:b3:00.5	Intel Corporatio	on Data Center GPU Flex 170		Not capable	Active	
	0000:b3:00.4	Intel Corporatio	on Data Center GPU Flex 170		Not capable	Active	
	0000:b3:00.3	Intel Corporatio	on Data Center GPU Flex 170		Not capable	Active	
	O 0000:b3:00.2	Intel Corporatio	on Data Center GPU Flex 170		Not capable	Active	
	🗆 🥖 Configure	SR-IOV for Data 0	Center GPU Flex 170		Not capable	Active	
	Quick fi		● Yes ○ No		Active	Disabled	
	Virtual func	tions	16 Maximum	31			
				Save Cancel Name	Intel Corporation 0x380		
		Vendor ID	0x8086	Subdevice ID	0x4905		
		Function Bus	0x0 0xb3	Subvendor ID Slot	0x8086 0x0		

Figure 3-2. Configure SR-IOV for Data Center GPU Flex 170

3. Verify VF Creation:

If VF creation is successful, the BDF (Bus, Device, Function) details of all the VFs will be listed.

Figure 3-3. Hardware PCI Devices

vmware [,] ESXi [,]			root@10.190.188.172 - Help	• Q Search •
Navigator	localhost.lind.intel.com - Mana	e		
▼ 📓 Host	System Hardware Lice	nsing Packages Services Security & users		
Manage Monitor	PCI Devices	🎖 Toggle passthrough 🥜 Configure SR-IOV 🧳 Hardware label 🚯 Reboot host CRefresh		Q b3 N
Virtual Machines	Power Management	C. Address Securition	SR-IOV SR-IOV	😸 Hardware Label 😞
Monitor		2. 0000:b3:00.6 Intel Corporation Data Center GPU Flex 170	Not capable Active	
More VMs		2 0000:b3:00.5 Intel Corporation Data Center GPU Flex 170	Not capable Active	
) El Storage		0000:b3:00.4 Intel Corporation Data Center GPU Flex 170	Not capable Active	
Q Networking		2. 0000:b3:00.3 Intel Corporation Data Center GPU Flex 170	Not capable Active	
		0000:b3:00.2 Intel Corporation Data Center GPU Flex 170	Not capable Active	
		0000:b3:00.1 Intel Corporation Data Center GPU Flex 170	Not capable Active	
			Active Disabled	
		Quick filters V		17 items
	[4] Recent tasks			
	5 Recent tasks	a Target a leiteter a Ouward a Stated	A Deput a	Completed =
	IdSK	 ranger innuaron Queued Started 	 Result A 	 Completed V

Attaching VFs to VMs:

- 1. Power Off VMs:
 - a. Under 'Virtual Machines', power off all VMs if they were previously powered on.
- 2. Edit VM Settings:
 - a. Select each VM.



- b. Click on the 'Actions' button \rightarrow 'Edit Settings'.
- c. The PCI details will appear.

Figure 3-4. Virtual Machines Window

ware ESXi	AA				root@1	0.190.188.172 • Help •	Q Search
Navigator	5 localhost.iind.intel.com - Virtual Machi	nes					
Host	1 Create / Register VM	e Power on Power off II Su	spend C Refresh	Actions			Q Search
Monitor	Virtual machine	v Status v	Used space	Win10_VM1	Host name	→ Host CPU	✓ Host memory
Vistual Machines	R) Win10 VM1	Normal	183.01 GB	Power	Unknown	0 MHz	0 MB
C white the second seco	U. B Win10 VM2	Normal	176.24 GB	To Guest OS	▶ Unknown	0 MHz	0 MB
Monitor	0 👔 Win10_VM3	Normal	177.57 GB	Snapshots	Unknown	0 MHz	0 MB
More VMs	🗆 🎒 Win10_VM4	Normal	177.47 GB	Console	Unknown	0 MHz	0 MB
Storage	C. B WinServ19_VM1	Normal	120.27 GB	S Autostart	Unknown	0 MHz	0 MB
Networking	WinServ19_VM2	Normal	118.73 GB	R Upgrade VM Compatibility	Unknown	0 MHz	0 MB
	Quick filters	~		Export			6 iten
				Export With Images			
		Win10 VM1					
		Guest OS Microsoft	Windows 10 (64-bit) VBS not	Edit settings			0 MHz
		Compatibility VMware Tools Yes		Be Edit the settings for this	virtual machine		MEMORY
		CPUs 8		Edit notes			0 B
		Memory 8 GB		🔊 Rename			STORAGE
							183.01 GB
				Unregister			
				Experience Delete			
	T Becent tasks			😮 Help	-		
	Task	Target v Initia	itor v Queur	Copen in a new window	✓ Result ▲		✓ Completed ▼
					Treating and		sampletod .

- 3. Attach VFs to VMs:
 - a. Review the PCI details.
 - b. Click 'Save' for each VM to attach VFs.
 - c. Repeat the process for all intended VMs.
- 4. Refresh UI and Power On VMs:
 - a. Refresh the ESXi UI page once all VFs have been attached.
 - b. Power on all VMs.
 - c. Log in to each VM using the respective IP address using any remote agents.



Memory	8 GB ~		
▶ 🛄 Hard disk 1	96 GB ~		
► 🔚 Hard disk 2	512 GB ~		
SCSI Controller 0	LSI Logic SAS	~	
SATA Controller 0			
USB controller 1		~	(
Retwork Adapter 1	VM Network	V Connect	(
► 🗐 CD/DVD Drive 1	Host device	✓ □ Connect	(
Video Card	Default settings	~	
PCI device 1	Data Center GPU Flex 170 - 0000:b	3:00.1	(

Figure 3-5. Edit Settings – Win10_VM1 (ESXi 7.0 U2 virtual machine)

3.2 Pass-through the VF PCI Device

Here are the steps to attach Intel $\mbox{\ensuremath{\mathbb{R}}}$ GPU Flex VFs to a virtual machine in VMware ESXi:

- 1. Log in to the target ESXi host via vSphere Host Client.
- 2. In the left pane, click on "VMs."
- 3. In the center pane, click on the desired Virtual Machine. Ensure that the VM is powered off.
- 4. To edit the virtual machine's settings, click "Edit." A pop-up window with the VM settings appears.
- 5. Click "Add other Device" and select "PCI device."
 - a. The new PCI device has been added. By default, it selects the first VF in the system, which may not be an Intel® GPU Flex VF since there could be other PCI devices in the system.
 - b. To select an Intel® GPU Flex VF, click the drop-down list and choose the desired PCI device with "GPU Flex" in the name. The BDFs listed here match the output of the `lspci | grep -i display` command. Add additional VFs by repeating this step.
- 6. All memory for the VM must be reserved. Expand "Memory" and set "Reserve all guest memory (All locked)" checkbox.
- 7. Click "Save."
- 8. To edit the virtual machine's settings, click "Edit."
- 9. Click the "VM Options" tab in the pop-up window.
- 10. Click the "Advanced" row to be expanded.

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- 11. Click "Edit Configuration." A "Configuration Parameters" pop-up displays.
- 12. Click "+ Add parameter". A new row is inserted at the bottom, populated with the following text, "Click to edit key."
- 13. Enter "pciPassthru.use64bitMMIO" in the key box.
- 14. Enter "True" in the Value field on the right.
- 15. Repeat step 'f' and return here.
- 16. Enter "pciPassthru.64bitMMIOSizeGB" in the key box.
- 17. Enter "64" in the Value field on the right.
- 18. To dismiss the pop-up, click OK.
- 19. To commit the changes, click Save.

Now the server has one or more VFs attached to your guest, and the VM is ready to be powered on.



4 Citrix* VM Setup

This section contains information and instructions for setting up VMware VM.

4.1 Installing Windows* Enterprise OS

1. Initiate VM Creation:

In the system where VF creation and provisioning are completed, click on 'Create a new virtual machine' and click Next.

Figure 4-1. New Virtual Machine Select Creation Type Window

🔁 New virtual machine		
1 Select creation type 2 Select a name and guest OS 2 Select a name and guest OS	Select creation type How would you like to create a Virtual Machine?	
3 Select storage 4 Customize settings 5 Ready to complete	Create a new virtual machine	This option guides you through creating a new virtual machine. You will be able to customize processors, memory,
	Deploy a virtual machine from an OVF or OVA file Register an existing virtual machine	network connections, and storage. You will need to install a guest operating system after creation.
vm ware		
		Back Next Finish Cancel

2. Specify VM Details:

Provide an appropriate name for the VM and choose the OS details.



Figure 4-2. New Virtual Machine Select a name and Guest OS

1 Select creation type	Select a name and gue	est OS			
2 Select a name and guest OS	Specify a unique name and OS				
Customize settings					
Ready to complete	Vame Win10_VM1				
	Virtual machine names can contain	up to 80 characters and they must be unique within each ESXi instance.			
	Identifying the guest operating system installation.	em here allows the wizard to provide the appropriate defaults for the operation	ating system		
	Compatibility	ESXi 7.0 U2 virtual machine	~		
	Guest OS family	Windows	~		
	Guest OS version	Microsoft Windows 10 (64-bit)	~		
		Enable Windows Virtualization Based Security			
vm ware*					

- 3. Storage Configuration:
 - Choose the appropriate storage details in the next tab and click 'Next'.

Figure 4-3. New Virtual Machine Customize Settings

Select creation type Select a name and guest OS Select storage	Customize settings Configure the virtual machine hardwa	re and virtual machine additional options
Customize settings Ready to complete	Virtual Hardware VM Options]
	Add hard disk M Add netwo	rk adapter 🗧 Add other device
	CPU	8 ~ ()
	🔻 🌆 Memory	
	RAM	8192 MB ~
	Reservation	4096 ~ MB ~
		Reserve all guest memory (All locked)
	Limit	Unlimited V MB V
	Shares	Normal V 1000 V
	Memory Hot Plug	
vm ware	▶ 🚍 Hard disk 1	96 GB 🗸 😣

4. Customize Virtual Hardware:

In the 'Customize Settings' page under the 'Virtual Hardware' tab: Attach the thin vmdk image that has been created by clicking on 'Add Hard Disk' \rightarrow 'Add Existing Hard disk'.



- Click on the 'VM Options' and update the highlighted options under 'Boot Options' and 'Advanced' options.
- Click on 'Edit Configuration' to open a new window.

Figure 4-4. Customize settings – existing hard disk

Select creation type Select a name and guest OS Select storage	Customize settings Configure the virtual machine hardware a	and virtual machine additional options				
Customize settings Ready to complete	Virtual Hardware VM Options	_				
	Add hard disk Add network adapter Add other device Add other device					
	Existing hard disk	8 0				
	 New persistent memory dis Exis New raw disk 	8192 MB ~				
	Reservation	4096 V MB V				
		Reserve all guest memory (All locked)				
	Limit	Unlimited ~ MB ~				
	Shares	Normal 1000				
	Memory Hot Plug	Enabled				
vm ware	▶ 🚍 Hard disk 1	96 GB ~				

 Edit Configuration: In the new window, click on 'Add Parameter'. Add the following key-value pairs: pciPassthru.use64bitMMIO=TRUE pciPassthru.64bitMMIOSizeGB=1024

Figure 4-5. Customize settings – existing hard disk: Configuration Parameters

Select creation type Select a name and guest OS	Customize settings Configure the virtual machine hardware a	and virtual machine additional (options	
Select storage Customize settings	Virtual Hardware VM Options			
Ready to complete	Add hard disk	idapter 🗧 Add other device	2	
	Existing hard disk	8 ~ 1		
	New persistent memory dis Exist New raw disk	in) hard disk 8192 MB	~	
	Reservation	4096 ✓ Reserve all guest mem	✓ MB ✓	
	Limit	Unlimited	~ MB ~	
	Shares	Normal	✓ 1000 ✓	
	Memory Hot Plug	Enabled		
vm ware [®]	▶ 🚍 Hard disk 1	96 GB	\sim	\otimes

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4	Configuration Parameters			
	+ Add parameter 🗙 Delete parameter		Q Search	
	Key ~	Value		~
	pciPassthru.use64bitMMIO	TRUE		
	pciPassthru.64bitMMIOSizeGB	1024		
			2 ite	ms ∡
			ОК Са	ncel
				A

2. Finalize VM Creation:

• Click 'Next' and 'Finish' to complete the VM creation process.

3. Power On VM:

- After the VM is successfully created, it will appear in the list.
- Click on 'Power On' to login to the VM.

Figure 4-6. Virtual Machines – Power On

avigator	Discalhost.iind.intel.com - Virtual Machines						
Host Manage	1 Create / Register VM I Console Power on	Power off 🔢 Sus	spend 健 Refresh 🛔	Actions		Q Se	arch
Monitor	. Virtual machine	✓ Status ✓	Used space v	Guest OS ~	Host name v	Host CPU v	Host memory ~
Virtual Machines	6 🗹 🔂 Win10_VM1	🕑 Normal	183.01 GB	Microsoft Windows 10 (64-bit)	Unknown	0 MHz	0 MB
🔂 Win10_VM1	U 👸 Win10_VM2	Normal	176.24 GB	Microsoft Windows 10 (64-bit)	Unknown	0 MHz	0 MB
Monitor	🗆 🖓 Win10_VM3	Normal	177.57 GB	Microsoft Windows 10 (64-bit)	Unknown	0 MHz	0 MB
More VMs	🗆 👸 Win10_VM4	Normal	177.47 GB	Microsoft Windows 10 (64-bit)	Unknown	0 MHz	0 MB
Storage	1 O. B WinServ19_VM1	Normal	120.27 GB	Microsoft Windows Server 20	Unknown	0 MHz	0 MB
Networking	1 . 👸 WinServ19_VM2	Normal	118.73 GB	Microsoft Windows Server 20	Unknown	0 MHz	0 MB
	Quick filters v						6 items
	Win10 VM	1					
	Guest OS	Microsoft Wi	ndows 10 (64-bit) VBS not enab	bled			CPU
	Compatibility						0 MINZ
	VMware Tools	Yes					MEMORY AND
	Memory	8 GB					0.0
							STORAGE

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5 Guest OS Setup

5.1 Guest OS Driver Setup

Download Windows Graphics Driver from Intel website to the Guest VM and follow steps:

https://www.intel.com/content/www/us/en/download/780185/intel-datacenter-gpu-flex-series-windows.html

1. Unzip the windows driver and double click Installer.exe

Q	6/8/2023 9:17 AM	File folder	
ø	6/8/2023 7:29 AM	Text Document	9 KB
Q	6/8/2023 7:28 AM	Application	78,368 KB
\odot	6/8/2023 7:29 AM	Text Document	37 KB
\odot	6/8/2023 7:29 AM	Text Document	570 KB
	0 0 0 0	 € 6/8/2023 9:17 AM Ø 6/8/2023 7:29 AM € 6/8/2023 7:28 AM Ø 6/8/2023 7:29 AM Ø 6/8/2023 7:29 AM 	C 6/8/2023 9:17 AM File folder Image: Solution of the system of

2. Click Begin Installation button:



3. Once driver Installation completes, Reboot the VM

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intel. _{Graphi}	cs Driver Installer v1.0.737.0		×
Pre-Install	Installation complete!		
Setup	Intel [®] recommends enabling Resiz systems for an optimized experien product. For more information on	able BAR on supported ice on your Intel® graphics Resizable BAR click <u>here</u> .	
Install			
Done!			
	Show details		
		Reboot Recommended	Finish



4. After Reboot, assigned Intel Graphics card can be verified from Display Adapters in the device manager:



intel. 6 Citrix Virtual Apps and Desktops configuration

The following sample Citrix* Virtual Apps and Desktops configuration explain about how to virtualize the apps and Desktops.

The sample configuration is not a best practices configuration and uses minimal virtual machines for testing and validation purposes only. For a complete setup guide for Citrix Virtual Apps and Desktops, refer to the Citrix documentation pages: <u>https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/install-configure</u>

In the sample configuration 3 VMs are used:

- 1. Active Directory Domain controller.
- 2. Citrix Delivery Controller. Citrix recommends using CVAD 2311 and onward for use with Intel Flex Datacenter GPUs.
- 3. Virtual Delivery Agent (VDA)

6.1 Active directory Domain controlled setup

Follow the steps to install the Active Directory

1: Open the Server Manager and select Add Roles and Features which proceeds with the Active Directory installation. Click on "Next."

Figure 6-1. Screenshot with Server Dashboard





2: Select Role-based or feature-based installation and Click Next.

Figure 6-2. Screenshot with Add Roles and Features Wizard



3: Select a server from the server pool and select a server and click next.

Figure 6-3. Screenshot with Add Roles and Features Wizard

Dashboard	WELCOME TO	O SERVER MANAGER			_
Local Server	Add Roles and Features Wizard	d		– 🗆 ×	
All Servers File and Storage	Select destination	n server		DESTINATION SERVER WIN-6Q0244776EL	
	Before You Begin Installation Type	Select a server or a virtual hard disk on which Select a server from the server pool	to install roles and features.		
	Server Selection	 Select a virtual hard disk 			
	Server Roles	Server Pool			
	Features	Filter:			
	Results	Name	Operating System		Hide
	2	//N.600244776El 10.105.174.11	Microsoft Windows Server 202	22 Datacenter Evaluation	
		1 Computer(s) found This page shows servers that are running Win	idows Server 2012 or a newer rele	ase of Windows Server,	



4: Select Active Directory Domain Services and click Next.

Figure 6-4. Screenshot with Select Server Roles



5: Select Group policy Management and click Next.

Figure 6-5. Screenshot with Group policy Management





6: Select Restart the destination server automatically if required and click install.

Figure 6-6. Screenshot with Confirm Installation Selections

Dashboard	WELCOME TO SERVER MANAGER			_
Local Server All Servers File and Storage Confir Before Instillat Server Server AD DS Confir Results	st and Features Wizard TO installation selections You Begin tion Type Selection Roles ses mation Active Directory Domain Services Group Policy Management Remote Server Administration Tools AD DS and AD LDS Tools AD DS Snap-Ins and Command-Line Tools Export configuration settings Specify an alternate source path	DESTINATIO WIN-BQC Lick Install. page because they tures, click Previous	Cancel	Hide

7: Once installation is complete, click close.

Figure 6-7. Screenshot with installation progress

Dashboard	WELCOME TO S	ERVER MANAGER			1
Local Server All Servers File and Storage	Add Roles and Features Wizard Installation progres	55	DESTINA WIN-0	TION SERVER	
	Before You Begin Installation Type Server Roles Features AD DS Confirmation Results	View installation progress Feature installation Installation started on WIN-6Q0244776EL Active Directory Domain Services Group Policy Management Remote Server Administration Tools Role Administration Tools AD DS and AD LDS Tools Active Directory module for Windows PowerShell AD DS Tools Active Directory Administrative Center AD DS Snap-Ins and Command-Line Tools			Hide
		You can close this wizard without interrupting running tasks. Vipage again by clicking Notifications in the command bar, and Export configuration settings	/iew task progress or o then Task Details.	pen this	



8: Configure Active Directory Domain Services

Locate the "Manage" tab with yellow exclamation. Click on it and select "Promote this server to a domain controller".

Figure 6-8. Screenshot with post-deployment Configuration



9: Select Add a new forest and enter forest name.

Figure 6-9. Screenshot with forest name selection





10: Enter Password and confirm Password, and click next, ignore Create DNS delegation.

Figure 6-10. Screenshot with Domain Controller Options

Dashboard Local Server	WELCOME TO SERVER MAN	AGER		×
All Servers AD DS File and Storage Services Þ	Domain Controller	Options		TARGET SERVER WIN-6Q0244776EL
	Deployment Configuration Domain Controller Options Additional Options Paths Review Options Prerequisites Check Installation Results	Select functional level of the new for Forest functional level: Domain functional level: Specify domain controller capabilitii Domain Name System (DNS) ser Global Catalog (GC) Read only domain controller (RC Type the Directory Services Restore Password: Confirm password:	rest and root domain Windows Server 2016 • Windows Server 2016 • es • DDC) Mode (DSRM) password	
		More about domain controller optic	ons	

11: Enter the NetBIOS domain name, click next.

Figure 6-11. Screenshot with NetBIOS domain name

Server Manager	lanager • Dashboar	d	- 🕄 🍢 Manage	— 🗇 🗙
🗰 Dashboard	WELCOME TO SERVER MAI	NAGER		2
Local Server All Servers	🗟 Active Directory Domain Service	s Configuration Wizard		- 🗆 ×
Image: AD DSImage: Bille and Storage Services ▷	Additional Option	S		TARGET SERVER WIN-6QO244776EL
	Deployment Configuration Domain Controller Options DNS Options Paths Review Options Prerequisites Check Installation Results	Verify the NetBIOS name assigned to The NetBIOS domain name:	the domain and change it if necessary AD-Controller	
		More about additional options		
			Rrevious Next > Inst	all Cancel



12: On Prerequisites Check click install.

Figure 6-12. Screenshot with Prerequisites Check

Dashboard	WELCOME TO SERVER MA	NAGER	
Local Server All Servers	Active Directory Domain Service	es Configuration Wizard	- 🗆 ×
I AD DS I File and Storage Services ▷	Prerequisites Che	ck	TARGET SERVER WIN-6QO244776EL
	All prerequisite checks pass	ed successfully. Click 'Install' to begin installation.	Show more X
	Domain Controller Options DNS Options Additional Options Paths Review Options Prerequisites Check Installation Results	computer Rerun prerequisites check View results Windows Server 2022 domain controllers have a default for the security *Allow cryptography algorithms compatible with Windows NT 4.0° that cryptography algorithms when establishing security channel sessions. For more information about this setting, see Knowledge Base article 94; go.microsoft.com/fwlink/?Linkld=104731).	setting named prevents weaker 2564 (http:// have static IP ed for a network chi IPv4 and b) assignment Name System
		More about prerequisites	

13: Once the installation is completed, the server will reboot. Now login as domain administrator.

Figure 6-13. Screenshot with AD Users and Computers

Server Manager · Dashboard Dashboard Local Server All Servers All Servers Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Active Directory Users and Computers In Saved Queries In Domain	🖾 A	D_Server erver Manager						-	Actions ×
Image: Dashboard Image: Local Server Image: Local Servers Image: Local	۲	€⊛-	Server N	Manager 🕨 Dashboai	ď	• 🔊	Manage To	ools Vi	ew Help
		Dashboard Local Server All Servers AD DS DNS File and Stor	rage Services ⊅	WELCOME TO SERVER MA Active Directory Users and Com File Action View Help Active Directory Users and Com Solution (Second Users) Pae.intel.citrix.com	NAGER	Type Domain	Description Folder to store your favo		×


14: Open command prompt and run ipconfig /all command and note the IP address.

Figure 6-14. Screenshot with IPConfig command

C:\Users\Administrator>ipconfig /all	
Windows IP Configuration	
Host Name . Primary Dns Suffix	WIN-6Q0244776EL pae.intel.citrix.com Hybrid No No pae.intel.citrix.com fm.intel.com
Ethernet adapter Ethernet0:	
Connection-specific DNS Suffix : Description . Physical Address. DHCP Enabled . Autoconfiguration Enabled . Link-local IPV6 Address . IPv4 Address . Subnet Mask . Lease Obtained . Lease Obtained . Default Gateway . DHCPV6 IAID . DHCPV6 IAID . DHCPV6 IAID . DHCPV6 CIIent DUID . DHCPV6 CIIent DUID . DHS ervers . NetBIOS over Tcpip	<pre>fm.intel.com vmxnet3 Ethernet Adapter 00-0C-29-F6-62-4A Yes Yes fe80::283:1dd9:6d13:36bb%3(Preferred) 10.105.174.11(Preferred) 255.255.255.0 Wednesday, November 22, 2023 6:30:51 AM Wednesday, November 22, 2023 6:30:52 PM 10.105.174.251 10.19.1.6 1006064091-2C-DC-E6-61-60-0C-29-F6-62-4A ::1 127.0.0.1 Enabled</pre>
C:\Users\Administrator>	



6.2 Setup Citrix Delivery Controller

Citrix Delivery Controller setup has two parts.

- 1. Join the server (VM2) into the domain, created in Section 5.1.
- 2. Install the Citrix Delivery Controller and Citrix Studio

6.2.1 Join the server to the Domain.

1: Open the network properties and update IPV4 properties. Select Use the following DNS server address. Enter the Active directory domain control Ip address as Preferred DNS server.

Figure 6-15.	Screenshot with	Updating	DNS	server	details
--------------	-----------------	----------	-----	--------	---------

Settings	—
Home Hom Home Hom	− □ × Network Connections ✓ ♂ Search Network Connections ✓
Find a se Graanize Dicable this network device Ethernet0 Properties Network 8	Diagnose this connection Rename this connection »
Connect using: Zerror Status	Internet Protocol Version 4 (TCP/IPv4) Properties × General Alternate Configuration
투고 Ethen This connection uses the following items:	You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
 Dial-u ☑ Interfor Microsoft Networks ☑ Interform Printer Sharing for Microsoft Net ☑ Interform Question Printer Sharing for Microsoft Net 	Obtain an IP address automatically Otise the following IP address:
% VPN ✓ _ Internet Protocol Version 4 (TCP/IPv4) _ Microsoft Network Adapter Multiplexor P ✓ _ Microsoft LLDP Protocol Driver	IP address:
Proxy Internet Protocol Version 6 (TCP/IPv6)	Default gateway:
Install Uninstall Description	Obtain DNS server address automatically Oute the following DNS server addresses:
Transmission Control Protocol/Internet Protoco wide area network protocol that provides comm across diverse interconnected networks.	Preferred DNS server: 10 . 105 . 174 . 11
OK	Validate settings upon exit Advanced
1 item 1 item selected	OK Cancel

2: In the Server Manager select Local Server and Click on WORKGROUP

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Figure 6-16. Screenshot with Updating DNS server details.

⋲ 🗸 🔹 Server Ma	nager • Local Server • 😕	🚩 Manage Tools	View Help
III Dashboard	For Citrix-DeliveryController		TASKS 💌
Local Server All Servers File and Storage Services	Computer name Citrix-DeliveryController Workgroup WORKGROUP	Last installed updates Windows Update Last checked for updates	Never Download Never
	Microsoft Defender Firewall Private: On Remote management Enabled Remote Desktop Disabled NIC Teaming Disabled Ethernet0 Assigned by DHCP	Microsoft Defender Antivirus Feedback & Diagnostics IE Enhanced Security Configuration Time zone Product ID	Real-Time Settings On (UTC-08:00 00455-500
	Operating system version Microsoft Windows Server 2022 Datacenter Evaluation Hardware information VMware, Inc. VMware20,1	Processors Installed memory (RAM) Total disk space	Intel(R) Xe 4 GB 89.37 GB
	EVENTS All events 8 total		TASKS 👻
	Filter P (B) •		۲
	Server Name ID Severity Source CITRIX-DELIVERY 10016 Warning Microsoft-Windows-DistributedCOM CITRIX-DELIVERY 10149 Warning Microsoft-Windows-DistributedCOM CITRIX-DELIVERY 10016 Warning Microsoft-Windows-DistributedCOM	Log Date and Time System 11/22/2023 6:52:44 AM nt System 11/22/2023 6:51:27 AM System 11/22/2023 6:49:12 AM	^

2: System Properties, click on Change button.

Figure 6-17. Screenshot with Updating System Properties.

Citrix-DeliveryCont	^{roller} erver Manager + Loc	al Server	• @	🚩 Manag	ge Tools	View	ctions × × Help
Dashboard Local Server Local Server All Servers File and Storage	PROPERTIE For Citrix-Deli System Properties Computer Name Hardware Advanced Mindowa uses the following inf on the network. Computer description: Computer description: Computer description: Computer description: Computer name: Citrix-DeliveryC Workgroup: WORKGROUP	S VeryController Remote ommation to identify your computer Controller IS Production Server [®] or or oroller	r -	Last installed upda Windows Update Last checked for up Microsoft Defende Feedback & Diagn IE Enhanced Securi Time zone Product ID	tes odates r Antivirus ostics ty Configuration	Never Downloo Never Real-Tim Settings On (UTC-08 00455-5	ad ae
	To rename this computer or change its do workgroup, click Change.	main or <u>Chapge</u>	ver 2022 Datacenter Evaluation 0,1	Processors Installed memory (Total disk space	RAM)	Intel(R)) 4 GB 89.37 GB	Ke 3
	OK Server Name CITRIX-DELIVERY CITRIX-DELIVERY CITRIX-DELIVERY	Cancel Apply ID Severity Source 10016 Warning Microsoft-Wir 10149 Warning Microsoft-Wir 10016 Warning Microsoft-Wir	IB +	Log Date ar System 11/22/2 t System 11/22/2 System 11/22/2	nd Time 2023 6:52:44 AM 2023 6:51:27 AM 2023 6:49:12 AM	•	

3: Select the Domain option, enter the Domain name, and click Ok button, enter Administrator and password. The server will reboot.



Figure 6-18. Screenshot with Joining the Domain.

Recycle Bin					
	System Properties Computer Name/Domain Changes You can charge the name and the membe computer name: Ctrix-DeliveryController Full computer name: Ctrix-DeliveryController Member of Omain: pae intel ctrix.com Workgroup: WORKGROUP OK	nship of this network resources. Computer Name/Domain Changes.	K rix.com domain.		
				Windows Server 2022 Da Windows Licens Ruid 2024 fo	tacenter Evaluation e valid for 180 days



4: Once the server is up, in the Windows command processor, enter the CMD command "lusrmgr.msc", add Domain Administrator to local Administrators Group.

Figure 6-19. Screenshot with	Add Domain	Administrator	to local	Administrators
Group.				

Iwarmgr - [Local Users and Groups (Local File Action View Help Image: Participation of the state of the	Groups]	- D X
Local Users and Groups (Local) 🛛 Name	Description	Actions
🔛 Users 🌆 Acc	s Control Assist Members of this group can remot	Groups
Groups Adu	Dusers Properties ? ×	More Actions
A Cer	cati Select Users, Computers, Service Accounts, or Groups X	Users 🔺
An Dev	ogra	More Actions
a Dis	Users, Service Accounts, or Groups Object Types	
See Eve	Log From this location:	
ag-Gu ag-Hy	-V pae intel.citrix.com Locations	
4 IIS_	IRS Enter the object names to select (examples):	
經 Net 陳 Per	ma Check Names	
👰 Per	ma	
A Pov	Us Advanced XK Cancel	
A RD	ndp	
See RD	lan, em	
and the second s		
A Rer	te N Changes to a user's group membership	
and the sto	e R Add Remove are not effective until the next time the user logs on.	
👰 Sys	n M OK Cancel Apply Help	
and Use	OK Cancer Apply Help	

5: Log off the server from local administrator and log in as Domain Administrator (Domain name/Administrator).



6.2.2 Install the Citrix Delivery Controller and Citrix Studio

1: Download Citrix Virtual Apps and Desktops ISO image from Citrix site.

https://www.citrix.com/downloads/citrix-virtual-apps-and-desktops/

2: Refer the following web site to configure the Delivery controller.

https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/install-configure

3: Right click on the ISO file and select the Mount.

Figure 6-20. Screenshot with Mount Citrix VAD ISO image





4: Double click on AutoSelect.exe

Figure 6-21. Screenshot with AutoSelect

••• • • • • •				
33 🗹 🔜 🖛	Manage	DVD Drive (E:) CVAD 2308	_	Ц×
File Home Share	View Application Tools			~ 🕐
← → ~ ↑ 😫 > D\	VD Drive (E:) CVAD 2308	ٽ ~		م
- Ouick accord	Name	Date modified	Туре	Size
	Citrix Receiver and Plug-ins	8/13/2023 9:19 PM	File folder	
Desktop 🖈	Documentation	8/13/2023 9:12 PM	File folder	
🔶 Downloads 🛛 🖈	Support	8/13/2023 9:27 PM	File folder	
🔛 Documents 🛛 🖈	x64	8/13/2023 9:29 PM	File folder	
📰 Pictures 🛛 🖈	x86	8/13/2023 9:29 PM	File folder	
Citrix 💉	🔄 AutoRun	8/13/2023 9:08 PM	Setup Information	1 KB
T : DC	🔀 AutoSelect	8/13/2023 9:08 PM	Application	868 KB
	ProductVersion	8/13/2023 9:17 PM	Text Document	1 KB
🖆 DVD Drive (D:) SSS_X6	ł			
🔀 DVD Drive (E:) CVAD 🕻				
💣 Network				
	4			>
8 items 1 item selected	867 KB			

5: Select Virtual App and Desktops and Click Start

Figure 6-22. Screenshot with VAD





6: Click on Delivery controller.

Figure 6-23. Screenshot with Delivery controller





7: Select I have read, understand, and accept the terms of the license agreement and click Next.

Figure 6-24. Screenshot with Software License agreement

	Software License Agreement
Licensing Agreement	Printable versi
Core Components Delivery Controller Features Firewall Summary Install Diagnostics License Server Data Finish	Lat Revised: August 19, 2020 CITRIX LICENSE AGREEMENT This is a legal agreement ("AGREEMENT") between the end-user customer ("you"), and is providing Citrix entity (the applicable providing entity is hereinafter referred to as 'CITRIX'). This AGREEMENT includes the Data Processing Agreement, the Citrix Services Security Exhibit and any other documents incorporated herein by reference. Your would be considered to the Citrix providing entities him. BY INSTALLING AND/OR USE THE PRODUCT, YOU AGREE TO BE BOUND BY THE TERMS OF THIS AGREEMENT, IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, DO TO INSTALL AND/OR USE THE PRODUCT. Nothing contained in any purchase of er or any other document submitted by you shall in any way modify or add to the terms and conditions contained in this AGREEMENT. This AGREEMENT does not apply to third party products sold by Citrix, which shall be subject to the terms of the third party provide. I. HOULT LICENSES. Construction of the software in a software PRODUCT and the software installed in Construction of the terms of the license agreement I do not accept the terms of the license agreement Data Data Proceeding Construction of the license agreement

7: Select the following core components and click Next.

Figure 6-25. Screenshot with Core components

	Core Components
 Licensing Agreement Core Components Delivery Controller 	Location: C:\Program Files\Citrix Change
Features Firewall Summary	Component (Select all) Delivery Controller Distributes applications and desktops, manages user access, and optimizes connections.
Install Diagnostics License Server Data	Web Studio A web-based management console that lets you configure and manage your Citrix Virtual Apps and Desktops deployment.
Finish	 Director Monitor performance and troubleshoot problems.
	License Server Manages product licenses.
	Studio Create, configure, and manage infrastructure components, applications, and desktop



8: By default, Controller address will be selected, Other enter the FQDN (Servername.DomainName.com) and click Next.

Figure 6-26. Screenshot with Delivery Controller selection

Licensing Agreement Core Components Delivery Controller Features	To add a Delivery Controller To add a Delivery Controller to the list, enter its address and th more Delivery Controllers for the site that you want to manage Director. To update the list for Studio, use the Studio configuration tool. use Group Policy or the Director configuration tool.	en click Add. Specify one or with Studio and monitor wit To update the list for Directo
Firewall	Configuration	
Install Diagnostics License Server Data	Controller address: (Enter the FQDN. IP addresses are not sur	oported.)
Finish	rest connection Pick	

9: Select the following features and click Next.

Figure 6-27. Screenshot with Features selection

 Licensing Agreement Core Components Delivery Controller Features Firewall Summary Install Windows Remote Assistance Select this only if you need the shadowing feature of Director Server. 		Features
	 Licensing Agreement Core Components Delivery Controller Features Firewall Summary Install Diagnostics License Server Data Finish 	 Feature (Select all) Install Microsoft SQL Server 2019 Express CU15 This is an optional component. If you have an existing SQL Server for storing desktop and application configurations and settings, do not select this option. Install Windows Remote Assistance Select this only if you need the shadowing feature of Director Server.



10: Select Firewall rules Automatically and click Next.

Figure 6-28. Screenshot with Firewall Rules

	Firewall				
 Licensing Agreement Core Components Delivery Controller Features Firewall Summary Install Diagnostics License Server Data 	The default ports are listed below. Delivery Controller Web Studio 80 TCP 443 TCP 89 TCP 443 TCP		Director License Server 80 TCP 7279 TCP 443 TCP 27000 TCP 8083 TCP		
Finish	Configure firewall rules Automatically Select this option to created even if the V Manually Select this option if y yourself.	automatically create Vindows Firewall is tu you are not using Wir	the rules in the Window rned off. ndows Firewall or if you	vs Firewall. The rules will be want to create the rules	

11: On Summary page click Install. The installation may take around 10-15 minutes based on network bandwidth and server configuration.

Note: If the server reboots while installing the prerequisite, repeat the same steps from Step 3. The installation process persists the selected option and jump on to the Install section.

Figure 6-29. Screenshot with Firewall Rules

	Summary	
Licensing Agreement	Review the prerequisites and confirm the components you want to install.	
Core Components Delivery Controller Features Firewall Summary Install Diagnostics License Server Data Finish	Installation directory C:\Program Files\Citrix Prerequisites Microsoft Visual x64 C++ Runtime Local Host Cache Storage (LocalDB) Microsoft SQL Server 2019 Express CU15 Microsoft Visual x86 C++ Runtime Microsoft Internet Information Services Microsoft IS Url Rewrite Microsoft 1S Url Rewrite Microsoft Application Request Routing Windows Remote Assistance Feature Core Components Delivery Controller Web Studio Director License Server Delivery Controllers	
	Eastures	



12: Keep the default options and click Next.

Figure 6-30. Screenshot with Diagnostics



13: Select Neither of the previous options and click Next.

Figure 6-31. Screenshot with License Server data

	License Server Data
 Licensing Agreement Core Components Delivery Controller Features Firewall Summary Install Diagnostics License Server Data Finish 	 Sharing License Server data with Citrix for the following purposes: <u>Citrix Licensing Call Home</u> To improve your experience, help you understand your product usage over time, drive adoption, and improve Citrix products, share system, product configuration, and usage data, including user/device data. <u>Citrix Licensing Customer Experience Improvement Program</u> - To improve your experience and Citrix products, share system, product configuration, and non-identifiable usage data. None of the above. <u>Citrix Licensing Telemetry</u> - In addition to the above optional programs, Citrix collects basic license telemetry data, as necessary for its legitimate interests, including license compliance. Learn more about the these programs and your options here.

14: Click Finish.



6.2.3 Install Citrix Studio

- 1: Repeat the steps from 3 to 5 specified in section 5.2.2.
- 2: Select Citrix Studio.

Figure 6-32. Screenshot with VAD Get Started

Got Started			Proparo Mad	ainos and Imagos	
Delivery Controller Start here. Select and install the essential services like Web Studi and Secure Private Access.	Delivery Con o, License Se	troller and other rver, Director, Studio,	Virtual Delivery A Install this agent to Windows multi-sess	gent for Windows Multi-session OS deliver applications and desktops from ion OS virtual machines or physical mac	hines.
Extend Deployment	0	Citrix Web Studio	0	Session Recording	9
Citrix License Server	0	Universal Print Ser	ver 📀	Citrix Workspace Environment Management Agent	0
Citrix StoreFront	0	Federated Authent	ication Service	Citrix Studio	0
Secure Private Access	0				

3: Select "I have read, understand, and accept" the terms of the license agreement and click "Next".

Figure 6-33. Screenshot with License Agreement

	Software License Agreement
Licensing Agreement Core Components Summary Install Finish	Printable ven Last Revised: August 19, 2020 CITRIX LICENSE AGREEMENT This is a legal agreement ("AGREEMENT") between the end-user customer ("you"), and the providing Cirix entity (the applicable providing entity is bereinafter referred to as "Services Security Exhibit and any other documents incorporated herein by reference. Your location of receipt of the Citrix product (hereinafter "RADUCT") and maintenance (hereinafter "MAINTENANCE") determines the providing entity as identified at https:// www.citrix.com/buy/licensing/citrix-providing-entities.html. BY INSTALLING AND/OR USING THE PRODUCT, YOU AGREE TO BE BEUND BY THE TRANS OF THIS DO NOT INSTALL AND/OR USE THE PRODUCT Nothine contained in any surchase
	order or any other document submitted by you shall in any way modify or add to the terms and conditions contained in this AGREEMENT. This AGREEMENT does not apply to third party products sold by Citrix, which shall be subject to the terms of the third party provider. 1. PRODUCT LICENSES. a. End User Licenses. Citrix hereby grants Customer a non-exclusive worldwide license to use the software in a software PRODUCT and the software installed in
	I have read, understand, and accept the terms of the license agreement I do not accept the terms of the license agreement



4: Click next on Core Components.

Figure 6-34. Screenshot with Core Components



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5: Click Install and then Finish.

Figure 6-35. Screenshot with Summary

Licensing Agreement	Review the presequicites and confirm the components you want to install
Summary Install Finish	Installation directory C:\Program Files\Citrix Core Components Studio

6.2.4 Install Citrix StoreFront

- 1: Repeat the steps from 3 to 5 specified in the section 6.2.2.
- 2: Select Citrix StoreFront.

Figure 6-36. Screenshot with Get Started

Get Started			Prepare Mach	ines and Images
Delivery Controller Start here. Select and install the essential services like Web Studi and Secure Private Access.	Delivery Conf o, License Ser	troller and other ver, Director, Studio,	Virtual Delivery Ag Install this agent to c Windows multi-sessi	ent for Windows Multi-session OS leliver applications and desktops from on OS virtual machines or physical machine
Extend Deployment	0	Citrix Web Studio	Ø	Session Recording
Citrix License Server	0	Universal Print Ser	ver 📀	Citrix Workspace Environment Management Agent
Citrix StoreFront	Ø	Federated Authent	ication Service	Citrix Studio
	0			



3: Accept the License Agreement and click Next.

Figure 6-37. Screenshot with StoreFront License Agreement

Citrix StoreFront	—		\times
StoreFront			
License agreement			
You must accept the terms of the license agreement to continue.			
CITRIX LICENSE AGREEMENT			
Use of this component is subject to the Citrix license or terms of service covering (s) and/or service(s) with which you will be using this component. This component use only with such Citrix product(s) and/or service(s).	the Citrix p nt is license	oroduct d for	
CTX_code EP_R_A10352779			
✓ Laccept the terms of thi	s license agi	reement	
< Back	Next >	Car	ncel



4: Review prerequisites and click Next.

Figure 6-38. Screenshot with Review Prerequisites

Citrix StoreFront	_		\times
StoreFront			
Review prerequisites			
StoreFront requires the following software before it can operate correctly. Refresh			
Internet Information Services (IIS) The required roles will be deployed automatically. ¹			
< Back	Next >	Car	ncel

5: Click Install.

Figure 6-39. Screenshot with Ready to Install

Citrix StoreFront	-		×
StoreFront			
Ready to install			
Setup is ready to install. Please review the notes and summary information below.			
Install now: Roles and subcomponents			
Citrix StoreFront 2311.0.0.27			
< Back	Install	Can	cel



6: Click Finish. After successful installation, the server will reboot.

Figure 6-40. Screenshot with Successfully Installed

#	Citrix StoreFront		-		×
St	toreFront				
	Successfully installed StoreFront				
	StoreFront has been successfully installed.				
	StoreFront installed successfully.				
	Citrix StoreFront 2311.0.0.27 installed successfully.				
	Note: StoreFront must be configured before it can be start automatically after you click Finish.	used. The administra	tion con	sole will	
				Finis	;h



6.2.5 Delivery Controller Configuration

1: Open Citrix Studio and click on Deliver applications and desktops to your users.

😫 Citrix Studio		=	×
File Action View Help			
🗢 🔿 🔰 📰 🔚			
Console Root		Actions	
Citrix Studio		Citrix Studio	-
a Citix StoreFront	Welcome Studio Help	View	•
		G Refresh	
	Welcome to Citrix Studio To begin, select one of the three options below.	Help	
	Site setup		
	Deliver applications and desktops to your users		
	Remote PC Access		
	Enable your users to remotely access their physical machines		
	Scale your deployment		
	Connect this Delivery Controller to an existing Site		

Figure 6-41. Screenshot with Welcome to Citrix Studio

2: Enter the Site Name and click Next.

Figure 6-42. Screenshot with Site Name

e Root ix Studio	Site Setup	
ix StoreFront	We	
	Studio	Introduction
	Introduction Databases	You have two options when creating a new Site. The simplest option is to automatically create a fully configured, production-ready Site. The second, more advanced option is to create an empty Site, which you must configure yourself.
	Si Licensing Connection Network Additional Features Summary Re Se	What kind of Site do you want to create? A fully configured, production-ready Site (recommended for new users) An empty, unconfigured Site Site name: PAE-Site
		Back Next Cancel



3: Prefer to keep the default options and click next. If required changes the Database and location

Figure 6-43. Screenshot with Database

Console Root Citrix Studio Citrix StoreFront	Site Setup				
	Studio Introduction Databases	Databases Databases stor Choose how yo © Create any (You can p	e information about Site setup, conf ou want to set up the databases. Lea d set up databases from Studio provide details of existing empty	iguration logging and monitoring. n more Generate scripts to manually set up databases on the database server	
	si Licensing Connection Network Additional Features Summary R	databases Provide databa Data type Site: Monitoring: Logging: Default d	y se details Database name CitrixPAE-SiteSite CitrixPAE-SiteMonitoring CitrixPAE-SiteLogging atabase names and SQL Server Expn nal Delivery Controllers for this Site	Location (formats) Localhost\sqlexpress Localhost\sqlexpress Localhost\sqlexpress Localhost\sqlexpress ess location are provided	
	54	1 selected	(Back Next Cancel	

4: Select the appropriate licensing option and click Next.

Figure 6-44. Screenshot with License Server

Site Setup	
eFront	
Studio	Licensing
	License server address: localhost:27000
✓ Introduction	Connected to trusted server
✓ Databases	I want to:
se Licensing	Use the free 30-day trial
Connection	You can add a license later.
Network	 Use an existing license The product list below is generated by the license server.
Additional Features	
Summary	There are no suitable licenses on your license server. You can
Re	allocate licenses using your License Access Code or you can add
	Learn more
se	
	Allocate and download Browse for license file
	Back Next Cancel



5: Select Connection type as No machine management and click Next.

Figure 6-45. Screenshot with Connection type

Citrix Studio			- 🗆 ×
File Action View Hel	P		
🖛 🔿 🙋 📷 🖬 🖬			
Console Root Console Root Citrix Studio Citrix StoreFront	Site Setup We	Connection	
	Studio	Select a Connection type. If machine management is not used (for example when using physical hardware), select 'No machine management.'	
	 ✓ Introduction ✓ Databases 	Connection type: No machine management	
	Si Connection Additional Features Summary	If you use a license eligible for cloud provisioning, public cloud hosts (such as Microsoft Azure, Google Cloud Platform, and Amazon Web Services) do not appear here right away. They will appear after the site creation completes.	
		Back Next Cancel	

6: Keep the default option and click Next.

Figure 6-46. Screenshot with Additional Features

Citrix Studio Citrix StoreFront	up		
S	tudio	Additional Features Use the following features to customize your Site. You can also enable/disable and configure features later.	
5 5 5 R	Introduction Databases Licensing Connection Additional Features Summary	Feature App-V Publishing Enables this feature if you will use applications from packages on App-V servers. If you inside this feature if you will use applications from packages on network share locations, you do not need to enable this feature.	
54		Back Next Cancel	



7: Click Finish

Root Site Setup	, ,			
StoreFront We Stu	udio	Summary		
v In v Di v Ci v Ci v Ci v Ci Si	traduction atabases censing onnection diditional Features ummary	Site name: Site database: Monitoring database: Logging database: Delivery Controllers: License server:	PAE-Site CitrisPAE-SiteSite Localhost/sqlexpress (no high availability) CitrisPAE-SiteMonitoring Localhost/sqlexpress (no high availability) CitrisPAE-SiteLogging Localhost/sqlexpress (no high availability) Citrix:DeliveryController.pae.intel.citrix.com localhost.27000	
			Back Finish Cancel	

Figure 6-47. Screenshot with Finish Studio Installation

8: On successful site configuration

Figure 6-48. Screenshot with Successful configuration of Citrix Studio





6.3 Setup Citrix Virtual Delivery Agent

The following steps describes setting up the Virtual Delivery Agent (VDA) on third VM.

6.3.1 Join the server to the Domain.

To join the server to the domain, follow the steps specified in the Section 6.2.1.

Figure 6-49. Screenshot with Delivery Agent joining the domain.

System Properties		×		
Computer Name/Domain Changes	×			
You can change the name and the membe computer. Changes might affect access to	ership of this network resources.	computer		*
Computer name:		-		
Citrix-VDA				
Full computer name: Citrix-VDA Member of	Computer Name/	Domain Chan <u>c</u> e to the pae.in	ges X	
Workgroup:	-		ОК	
WORKGROUP				
ОК	Cancel			
ОК	Cancel	Apply		



6.3.2 Install the Virtual Delivery Agent.

- 1: Repeat the steps from 1 to 5 specified in the section 6.2.2.
- 2: Click Virtual Delivery Agent for Windows Multi-Session OS.

Figure 6-50. Screenshot with Get Started

Get Started			Prepare Mach	ines and Images	
Delivery Controller Start here. Select and install the Deli essential services like Web Studio, Li and Secure Private Access.	very Cont cense Ser	troller and other ver, Director, Studio,	Virtual Delivery Ag Install this agent to d Windows multi-sessi	ent for Windows Multi-session leliver applications and desktops fr on OS virtual machines or physical	OS om machines.
Extend Deployment Citrix Director	0	Citrix Web Studio	0	Session Recording	3
Citrix License Server	0	Universal Print Serv	ver 🕐	Citrix Workspace Environmer Management Agent	nt 🕜
Citrix StoreFront	?	Federated Authenti	ication Service 🤇	Citrix Studio	3
Secure Private Access	0				

3: Select the MCS image and click Next.

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Figure 6-51. Screenshot with Environment Configuration

Environment Configuration Core Components I want to: Additional Components I want to: Delivery Controller Select this option if you plan to use Citrix Machine Creation Services (MCS) to provision virtual servers from this master image. Features Create a master MCS image Summary Select this option if you plan to use Citrix Machine Creation Services (MCS) to provision virtual servers from this master image. Create master image to be used for Citrix Provisioning (PVS) streaming Summary Install Diagnostics Finish Create master image to be used by MCS to provision PVS target device (Valid only for Citrix Cloud Deployments) (Tech Preview)		Environment
Additional Components I want to: Delivery Controller Create a master MCS image Select this option if you plan to use Citrix Machine Creation Services (MCS) to provision virtual servers from this master image. Create master image to be used for Citrix Provisioning (PVS) streaming Select this option if you plan to use PVS wizard or third-party tool to provision PVS target device. Enable Brokered Connections to a Server Select this option to install the VDA on a physical or virtual server that will NOT be use by any provisioning tools. Create master image to be used by MCS to provision PVS target device (Valid only for Citrix Cloud Deployments) (Tech Preview) 	Environment Core Components	Configuration
Select this option if you plan to use Machine Creation Service (MCS) to create Citrix Provisioning (PVS) target device from this master image.	Additional Components Delivery Controller Features Firewall Summary Install Diagnostics Finish	 I want to: Create a master MCS image Select this option if you plan to use Citrix Machine Creation Services (MCS) to provisio virtual servers from this master image. Create master image to be used for Citrix Provisioning (PVS) streaming Select this option if you plan to use PVS wizard or third-party tool to provision PVS target device. Enable Brokered Connections to a Server Select this option to install the VDA on a physical or virtual server that will NOT be use by any provisioning tools. Create master image to be used by MCS to provision PVS target device (Valid only for Citrix Cloud Deployments) (Tech Preview) Select this option if you plan to use Machine Creation Service (MCS) to create Citrix Provisioning (PVS) target device from this master image.

4: Select the following core components and click Next.

Figure 6-52. Screenshot with Core Components

	Core Components
Core Components Additional Components Delivery Controller Features Firewall Summary Install Diagnostics Finish	Location: C\Program Files\Citrix Change Virtual Delivery Agent (Required) The software agent that is installed on the virtual or physical machine that provides the virtual desktop or application to the user. Citrix Workspace App Client software that enables users to access their documents, applications, and desktops from any device, including smartphones, tablets, and PCs. Client Software that enables users to access the software that the software that enables users to access the software that enables users to accessoftware that enables users to access the software that e



5: Select the following additional components and click Next.

Figure 6-53. Screenshot with Additional components





6: Enter the Delivery controller name specified Section 5.2.2 Step 8 and click Test Connection. Once the connection test is passed (green check mark) click Add. Click Next.

ⁱ igure 6-54. Screensho	ot with Configure	Delivery	Controller
------------------------------------	-------------------	-----------------	-------------------

Environment	
Core Components Additional Components Delivery Controller Features Firewall Summary Install Diagnostics Finish	How do you want to enter the locations of your Delivery Controllers? Do it later (Advanced) Do it later (Advanced) Choose locations from Active Directory Let Machine Creation Services do it automatically Controller address: (Enter the FQDN. IP addresses are not supported.) Citrix-DeliveryController.pae.intel.citrix.com Test connection

7: Keep the default selection, click Next.

Figure 6-55. Screenshot with Features selection

	Features
Environment Core Components Additional Components Delivery Controller Features Firewall Summary Install Diagnostics Finish	Feature (Select all) Use Windows Remote Assistance Enable Windows Remote Assistance. Use Real-Time Audio Transport for audio Uses UDP ports 16500 - 16509. Use Screen Sharing Use TCP ports 52525 - 52625. Learn more. Is this VDA installed on a VM in the Cloud (i.e. Azure, AWS, Google)? Communicates to Citrix that the VDA is installed in a cloud VM.
	Back Next Cano



8: Select Automatically in the Firewall port selection and click Next.

Figure 6-56. Screenshot with Firewall configuration

	Firewall
 Environment 	The default ports are listed below.
 Core Components 	
 Additional Components 	Controller Communications
✓ Delivery Controller	80 TCP
✓ Features	443 TCP
Firewall	1494 TCP
Summany	2598 TCP
Summary	8008 TCP
Install	443 UDP
Diagnostics	1494 UDP
Finish	2390 004
	Configure firewall rules:
	Automatically
	Select this option to automatically create the rules in the Windows Firewall. The rules will be created even if the Windows Firewall is turned off.
	O Manually
	Select this option if you are not using Windows Firewall or if you want to create the rules yourself.

9: On the summary screen click Install. Once the installation is complete, the server may reboot automatically.

Figure 6-57. Screenshot with Install prerequisites

Installing	About 1 minute remaining
 Hide Prerequisites Microsoft Visual x86 C++ Runtime Microsoft Visual x86 C++ Runtime Microsoft Remote Desktop Session Host Windows Remote Assistance Feature Core Components Virtual Delivery Agent Citrix Workspace App Post Install Component Initialization 	Installed Installed Installing
	Microsoft Remote Desktop Session Host Windows Remote Assistance Feature Core Components Virtual Delivery Agent Citrix Workspace App Post Install Component Initialization



10: One the server reboots, restart the installation and make sure the All the following components are installed. And click Finish.

Figure 6-58. Screenshot with Finish Installation

	Finish Installation	
 Environment Core Components Additional Components Delivery Controller Features Firewall Summary Install Diagnostics 	The installation completed successfully. Prerequisites Microsoft Visual x84 C++ Runtime Microsoft Remote Desktop Session Host Windows Remote Assistance Feature Core Components Virtual Delivery Agent Citrix Workspace App Post Install Component Initialization 	Succes
✓ Diagnostics Finish	Post Install Component Initialization To optimize desktop settings, download Citrix Optimize completes. Learn more about Citrix Optimizer in CTX224676	Initialized
	Restart machine	

11: Open the Citrix Studio and enter the Delivery controller address configured in section 5.2.5 and click connect.

🗱 Citrix Studio			-	\times
File Action View Help				
← → □□□ □				
🗱 Citrix Studio		Actions		
_		Citrix Studio		-
s	Studio Help	View		•
		C Refresh		
	Unable to find a Delivery Controller	inelp.		
	Enter a Controller address to get started			
	The Delivery controller could not be contacted at the specified address, it may not be installed on the machine or there is a communication failure.			
	Enter the address of the Controller you want to configure:			
	Connect			
]		1		

The VDA server is now connected to the Delivery controller.



6.4 Apps and Desktop Virtualization

6.4.1 Create Machine Catalogs.

CVAD 2311 is needed for use with Machine Creation Services (MCS). More information about MCS, creating a Master VM for MCS and how to create MCS machine catalogs can be found in the Citrix documentation: <u>https://docs.citrix.com/en-us/citrix-virtual-apps-</u> <u>desktops/install-configure/machine-catalogs-create/create-machine-catalog-</u> <u>vmware</u>

1: Login to the Delivery Controller VM and open Citrix Studio MMC application.



2: Select Machine Catalogs in the left pane, and then select Create Machine Catalog in the action bar on the Right pane. And click Next.



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3: Select Multi-session OS and click Next.

Console Root	Machine Catalog Setup			_
Console Root Circle Root Circle Studio (PAE-Site) Search Machine Catalogs Delivery Groups Applications Policies Looring Console Controllers StoreFront Circle StoreFront	Machine Catalog Setup Studio	Operating System Sect an operating system for this Machine Catalog. Of Mini-section OB Composition OS machine catalog provides hosted abared desktops for a large-scale abored abared desktops. Or angle-section OB Bigle-section OB Composition Catalog provides VDI desktops ideal for a variety of a large-scale abored Catalog provides VDI desktops ideal for a variety of a large-scale scale abored Catalog provides users with remote access to their solicial office desktops, allowing them to work at any time. Descence Texture the opposer management connections suitable for use with Remote PC cases but you can create one after completing this ward. Then edit this machine chalog to specify that connection.	Catalog	

4: Select Another service or technology and click Next.

Hardware encoding is supported and active when using MCS on CVAD 2311 or later versions.

rix Studio (PAE-Site)	Machine Catalog Setup		
Search Machine Catalogs			Catalog
Applications	Studio	Machine Management	
Logging		This Machine Catalog will use:	
Configuration		Machines that are power managed (for example, virtual machines or blade PCs)	
Administrators	✓ Introduction	Power management is not available when there are no host connections	
Controllers	✓ Operating System	Machines that are not power managed (for example, physical machines)	
	Machine Management		
StoreFront	Machines	Deploy machines using:	
App-V Publishing	Summary	 Citrix Machine Creation Services (MCS) 	
rix StoreFront		MCS is not available when using physical hardware.	
		Citrix Provisioning	
		 Another service or technology I am not using Citrix technology to manage my machines. I have existing machines already prepared. 	
		Note: For Linux OS machines, consult the administrator documentation for guidance.	
		Back Next Cancel	



Citrix Studio					
e Action View Help					
Console Root Citrix Studio (PAE-Site)	Machine Catalog Setup				
Search Machine Catalogs				Cat	talog
Applications	Studio	Machines			
2 Logging		Import or add machine accou	Select Computers		>
 Configuration Administrators 	✓ Introduction	Computer AD account	Select this object type:		
Controllers	✓ Operating System		Computers	Qbject Typ)es
Hosting	✓ Machine Management		From this location:		
StoreFront	Machines		Entire Directory	Location	s
App-V Publishing	Summary		Enter the object names to select (examples):		
Citrix StoreFront			CITRIX-VDA	Check Na	mes

Import list... Export list... Add computers...

Back Next Cancel

-

Select the minimum functional level for this
 7.9 (or newer)

Machines will require the selected VDA version (or newer) in order to register in Delivery Groups that reference this machine catalog. Learn more

<u>____</u>

The VDA server will be added to the catalog and click Next.

6: Enter Machine Catalog name and description and click Finish.

Console Root	Machine Catalog Setup		
Console Root Configuration Configurat	Machine Catalog Setup Studio ~ Introduction ~ Operating System ~ Machines Summary	Summary Machine type: Multi-session OS Machine management: Physical Provisioning method: Another service or technology Number of machines addet: 1 VOA version: 73 (or newer) Scope: Primary Zone: Primary Machine Catalog name: PAL Machine Catalog	Catalog
		Machine Catalog description for administrators: (Optional)	
		Sample PAE machine catalog	
		To complete the deployment, assign this Machine Catalog to a Delivery Group by selecting Delivery Groups and then Create or Edit a Delivery Group. Back Finish Cancel	

6.4.2 Create Delivery Group.

1: Select Delivery Group in the left pane, and then select Create Delivery Group in the action bar on the Right pane. And click Next.



👪 Citrix Studio							-	\times
File Action View Help								
🔶 🐟 📩 🖬 🖬								
Console Root					Actions			
 Citrix Studio (PAE-Site) Search 					Delivery 0	Groups		-
Machine Catalogs	Delivery Group +	Delivering	No. of machi	Sessions in use	🛅 Crea	te Delivery Group		
B Delivery Groups					View			•
Applications					C Refre	esh		
2 Logging					👔 Help			
V 🖏 Configuration								
Controllers								
Hosting								
Licensing								
App-V Publishing								
Zones								
Citrix StoreFront								
	1							

2: Select a Machine Catalog and click Next.

Console Root Citrix Studio (PAE-Site) Search Machine Catalogs Belivery Groups	Create Delivery Group						
		Mac	hines			iroup	
Policies	Studio	Selec	t a Machine Catalog.				
✓ [™] Configuration			Catalog	Туре	Machines		
Administrators	✓ Introduction	•	PAE Machine Catalog	RDS Manual Random	1		
Hosting	Machines		Sample PAE machine cat	alog			
and Licensing	Users						
StoreFront	Applications						
Zones	Desktops						
₿₿ Litrix storeFront	summary	Choc	se the number of machines fo	r this Delivery Group: 1	-+		
				Back Next	Cancel		

3: Keep the default option and click Next or select the Restrict use of the Delivery Group to the following users.

isole Root	Create Delivery Group			
Search Machine Catalogs Delivery Groups Applications Policies	Studio	Users	āroup	
Policie of the second se	✓ Introduction ✓ Machines Users Applications Desktops Summary	Specify who can use the applications and desktops in this Delivery Group. You can assign users sort or usurbandinated users. In our any authenticated users to use this Delivery Group. The applications and desktops in this Delivery Group. The applications are used to be the following users: Implications are applications and desktops in this Delivery Group. Implications are applications and desktops in this Delivery Group. Implications are applications and desktops in this Delivery Group. Implications are applications and desktops in this Delivery Group. Implications are applications are applied and applications are applied and applications are applied and applications and applications are required to access. Implications and densktops in the Delivery Group. Implications are applied and applications are applications are applications are applications are		



Create Delivery Group

4: (Optional) Select the Applications by clicking Add and click on from start menu.

File Action View Help	Create Delivery Group		
Console Root Circle Studio (PAE-Site) Circle Studio (PAE-Site) Circle Studio (PAE-Site) Stachine Catalogs Controllers	Studio ✓ Introduction ✓ Machines ✓ Uters Applications Summary	Applications Bit deplotedions, stick "Add" and those a succe. Then select applications from the solesce ted groups on the solesce applications in a non-default folder and change applications Image: team of the solesce applications in a non-default folder and change applications Image: team of tea	houp ,

5: (Optional) Select the application for Virtualization and click Next.

tudio	Applications	
Introduction	To add applications, click "Add" and choose a source. Then select applications from that so If you choose Application Groups, all current and future applications in the selected group: be added. You can also place new applications in a non-default folder and change applicat properties.	urce. will ion
Urerr	Name	+
	Contemporary Paint	
Applications	Snipping Tool	
Desktops	WordPad	
	Add Remove Properties	
	Place the new applications in folder:	
	Applications\	
	Change	

6: On Desktops page click Add button and add VDA server.

Studio	Desktops
	Add users or groups who can launch a desktop from this Delivery Group.
[*] Introduction	Add assignments
Machines	
Users	
Applications	
Desktops	
Summary	



7: Enter Desktop Displa	y name and	Description,	click OK.
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	Display name:	PAE Desktops	
Studio	Description:	Sample PAE Dekstops	
		The name and description are shown in Citrix Workspace app.	
/ Introduc	Restrict laund	thes to machines with tag:	
Machine			
Users	Allow everyo	ne with access to this Delivery Group to use a desktop	
Applicati	Restrict desk	top use to:	
Summar	Add us	ers and groups	
	Add	Remove	
	Enable deskt Clear this che	op cck box to disable delivery of this desktop.	

8: On the Summary page enter the Delivery Group Name and description. And click Finish.

Studio	Summary						
 ✓ Introduction ✓ Machines ✓ Users 	Machine Catalog: Machine type: Allocation type: Machines added:	PAE Catalog Multi-session OS Random AD-Controller\CITRIX-VDA 1 unassigned					
Applications	Users:	AD-Controller\Administrator					
Desktops	Desktops:	PAE Desktops					
Summary	Applications to add: Folder for new applications: Launch in user's home zone:	Snipping Tool, WordPad, Paint Applications\ No					
	Delivery Group name:						
	PAE Delivery Group						
	Delivery Group description, used as label in Citrix Workspace app (optional):						
	Sample PAE delivery Group						

6.4.3 Access Virtualized App and Desktop

1: Login to the Delivery Controller VM and open Citrix Studio MMC application. Copy the Receiver for Web site URL.

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2: Open the web browser and past the URL, and Login to the StoreFront using Domain control credentials.

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3: Click on the Desktops



4: Click on Desktops and verify the GPU utilization.



intel. 7 Known Issues and Workarounds

7.1 Anti-Aliasing

Issue: When running benchmarks or games with Anti-Aliasing set to ON or at AA level greater than two, it is observed that the overall performance is affected in terms of the benchmark scores and FPS.

Workaround: Intel has known issues with Anti-Aliasing (AA/MSAA). So, it is recommended to disable AA in the application settings before running them on Intel Data Center GPU Flex.

7.2 GPU Benchmarking with >1VF/SoC

Issue: During the execution of benchmarks or GPU-heavy workloads in a multi-VM/SOC scenario, users may encounter application hangs, VM disconnects, or Timeout Detection and Recovery (TDR) occurrences.

Workaround: This issue may stem from the safeguarding mechanism of Quality of Service (QoS) by the VF Scheduler. While it is generally recommended to adhere to default parameters according to official vGPU profiles, it is feasible to adjust parameters, particularly when benchmarking in profiles with more than one VF/SoC, to potentially enhance performance or alleviate functional failures.

To address this:

Execute the following command on the host shell:

esxcli intdcgpu configuration set -d \$pci_address -v <VF Number> -p
<Option> -i <Value>

For instance: - Set PT to 128 milliseconds for VM1: esxcli intdcgpu configuration set -d 0000:56:00.0 -v 1 -p 11 -i 128000

If the issue persists, consider increasing the Execution_Quantum (EQ) value in multiples of the default EQ value:

- Set EQ to 32 for VM1:

esxcli intdcgpu configuration set -d 0000:56:00.0 -v 1 -p 10 -i 32

Note: It is crucial to proceed with caution when making these adjustments, particularly in production deployments, as they have the potential to cause QoS issues. Setting excessively high PT values may lead to complete Denial of Service (DoS) instances, which could manifest as GPU hangs or TDRs if certain VMs are running prolonged or malicious workloads.



7.3 Custom Configuration of VF Local Memory

Issue: Errors related to Base Address Register (BAR) size may be observed when attempting to change the Lmem of VF to certain values. This limitation is inherent in the ESXi Hypervisor with Resizable BAR support, where it is not feasible to allocate Lmem values greater than the allocated BAR size for the given VF count.

For example, in the V3 profile:

- Combinations that will work: 1 GB, 2 GB, 2 GB
- Combinations that may fail: 1 GB, 3 GB, 2 GB; 500 MB, 500 MB, 5 GB

Workaround: Currently, there is no workaround available. This issue stems from a limitation within the ESXi hypervisor. Intel is collaborating with VMware to address this matter.

7.4 SpecviewPerf Performance

Issue: Low scores are observed in SpecViewPerf when comparing against the Intel's Alchemist GPU.

Workaround: Currently, intel does not have a solution for this issue. Intel anticipates that it will be addressed and released in future Windows Graphics Driver builds.

7.5 Long Windows Driver Installation Times in Multiple GPU Case (>4 GPUs)

Issue: It may be observed that the installer takes a long time to complete the GPU driver installation in the case of multiple GPUs installed on the system. This is expected OS behavior. While installing the driver, the OS attempts to update the driver for devices that already have the driver installed.

Workaround: It has been noticed that the use of "DIIRFLAG_FORCE_INF" (which guarantees that every INF contained in the base INF will be installed) is the reason why the driver installation is taking longer than usual. This approach is authorized by Microsoft*. The installer team has introduced an external command-line option to disable the 'DIIRFLAG_FORCE_INF' flag to work around this problem. The usage command would be: **Installer.exe** -- **doNotForceInf** --**unsigned**.

7.6 IGCC Support for Flex GPUs

Issue: IGCC is not enabled on Intel Data Center GPU Flex (VMs or Baremetal) to control the GPU Display settings.

Workaround: Since Flex GPU is in headless mode, it has been decided not to support IGCC on Intel Data Center GPU Flex Series.

7.7 Fixed Mode Scheduling

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Issue: Performance drop is observed when using Fixed mode scheduling (schedule_if_idle=1).

Workaround: This issue is acknowledged, and efforts are underway to address it through updates to the scheduler. In the interim, Intel advises using Flexible mode to achieve better performance.

7.8 VF Telemetry Using Intel[®] XPU Manager (Intel[®] XPUM)

Issue: Intel XPUM does not display full GPU telemetry data inside the VM (in SRIOV mode).

Workaround: In the case of SRIOV, Intel XPUM will not be able to extract all the hardware telemetry information from inside the VM due to security reasons and hypervisor restrictions on accessing the hardware. It is recommended to utilize Microsoft tools such as Task Manager, GPU View, WMI API, PerfMon, and others.



8 References

• Admins can use the HDX monitor tool use validate the correct usage of the GPU and video

encoding: https://support.citrix.com/article/CTX135817/hdx-monitor-3x

HDX Monitor 3.5 (M1022H2-4059-1)				- 0	×
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- Citrix recommends to install the Citrix Workspace App for Windows version 2311.1 or later: <u>https://www.citrix.com/downloads/workspace-app/windows/workspace-app-for-windows-latest.html</u>.
- More information on the HDX graphics policies and best practices can be found in the Tech Zone article: <u>Design Decision HDX Graphics</u> <u>Overview</u>