

EXPLORE

CODEQT1767LV

What's New in Scripting GPU Management with PowerShell and Python *A VMware {code} Session*

Tony Foster

Sr. Principal Engineering Technologist – Dell Technologies

#vmwareexplore #CODEQT1767LV

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Introduction and Environment

Tony Foster (Wondernerd)

- Sr. Principal Engineering Technologist
- Virtualized for 19 years
- [linkedin.com/in/wondernerd](https://www.linkedin.com/in/wondernerd)

Home Lab:

- VVF 9.0
- NVIDIA L4 GPU with vGPU v19.0
- Dell PowerEdge R6515*

**Not a validated configuration*



Wondernerd.net



Assumptions

- Environment has current generation GPU(s)
- For NVIDIA GPUs:
 - Valid support
 - Current driver installed
 - vGPU [19.0] or NVAIE
- VCF PowerCLI 9.0
- Python 3+ [3.13.7]

Agenda



Managed Object Browser



Direct Path Profiles

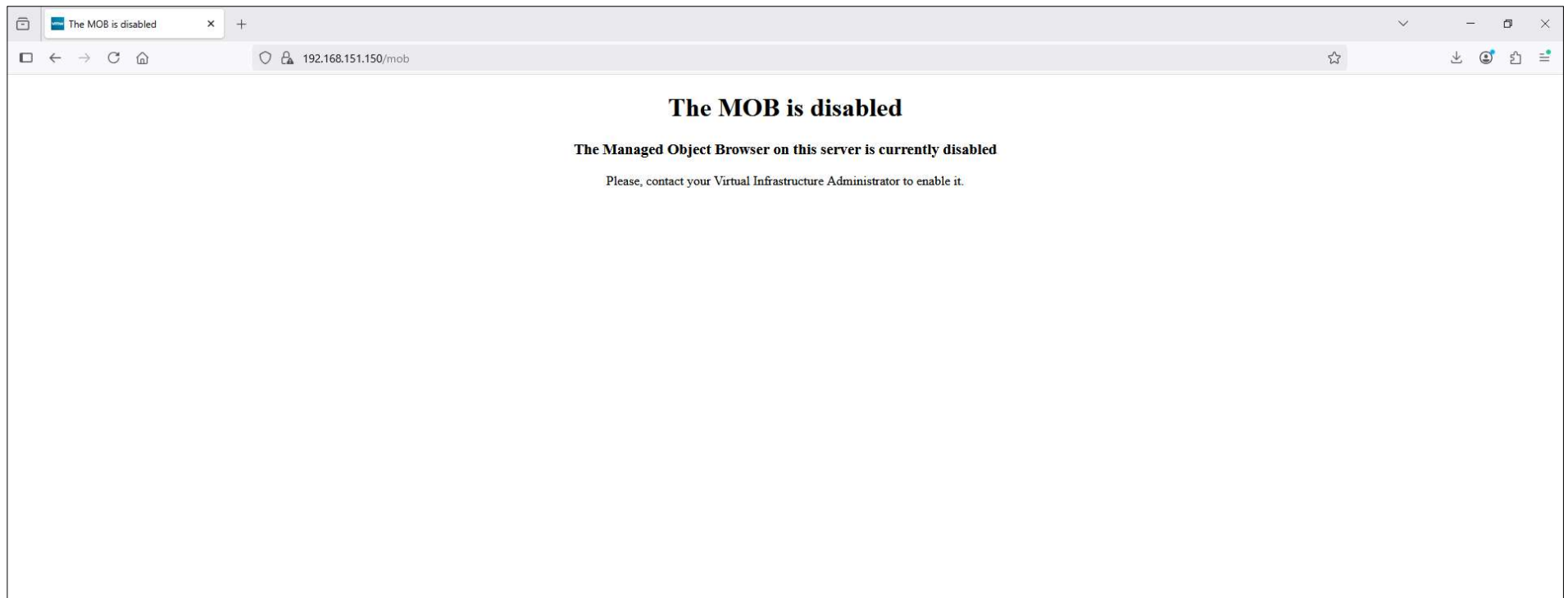
VCF PowerCLI

VCF Python SDK



Other Areas

Suprise!

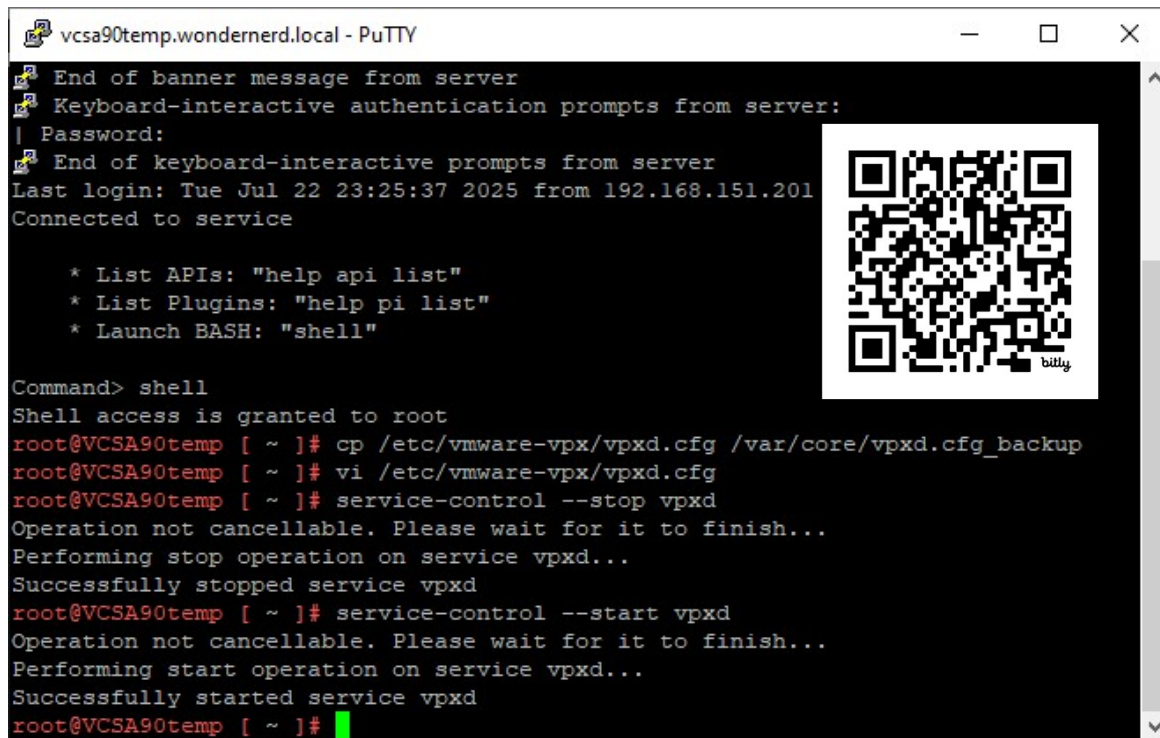


Enable Access to the MOB

1. Enable Bash Shell (and SSH)
2. Backup `vpzd.cfg`
3. Modify `vpzd.cfg`
Set:
`<enableDebugBrowser>true`
`</enableDebugBrowser>`
4. Restart `vpzd`
`service-control -stop vpzd`
`service-control -start vpzd`
5. Open MOB

Refer to KB: 401669

<https://knowledge.broadcom.com/external/article/401669>



```
vcsa90temp.wondernerd.local - PuTTY
End of banner message from server
Keyboard-interactive authentication prompts from server:
| Password:
End of keyboard-interactive prompts from server
Last login: Tue Jul 22 23:25:37 2025 from 192.168.151.201
Connected to service

* List APIs: "help api list"
* List Plugins: "help pi list"
* Launch BASH: "shell"

Command> shell
Shell access is granted to root
root@VCSA90temp [ ~ ]# cp /etc/vmware-vpx/vpzd.cfg /var/core/vpzd.cfg_backup
root@VCSA90temp [ ~ ]# vi /etc/vmware-vpx/vpzd.cfg
root@VCSA90temp [ ~ ]# service-control --stop vpzd
Operation not cancellable. Please wait for it to finish...
Performing stop operation on service vpzd...
Successfully stopped service vpzd
root@VCSA90temp [ ~ ]# service-control --start vpzd
Operation not cancellable. Please wait for it to finish...
Performing start operation on service vpzd...
Successfully started service vpzd
root@VCSA90temp [ ~ ]#
```

It works!

Managed Object Browser

192.168.151.150/mob

Home

Logout

Managed Object Type: **ManagedObjectReference:ServiceInstance**

Managed Object ID: **ServiceInstance**

Properties

NAME	TYPE	VALUE
capability	Capability	capability
content	ServiceContent	content
serverClock	dateTime	"2025-07-22T23:41:23.334446Z"

Methods

RETURN TYPE	NAME
dateTime	CurrentTime
HostVMotionCompatibility[]	QueryVMotionCompatibility
ServiceContent	RetrieveServiceContent
ProductComponentInfo[]	RetrieveProductComponents
Event[]	ValidateMigration

When done, disable access to the MOB



DirectPath Profiles

VCF PowerCLI

VCF Python SDK

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DirectPath Profiles

DPP Utilization

DirectPath Profiles Utilization

Legend: Consumed (orange), Remaining (blue), Resources prohibited (grey)

Name	Description	Consumed	Remaining	Maximum	Utilization	Vendor
NVIDIA L4-4Q profile	DPP for L4-4 Q profile	0 instances	3 instances	4 instances	0/4	Nvidia
NEW -> NVIDIA L4-3B profile	NEW vGPU P profile in 19.0 DPP for L4-3 B profile	1 instance	7 instances	8 instances	1/8	Nvidia
NVIDIA L4-2Q profile	DPP for L4-2 Q profile	0 instances	7 instances	8 instances	0/8	Nvidia
NVIDIA L4-6Q profile	DPP for L4-6 Q profile	0 instances	3 instances	4 instances	0/4	Nvidia

DirectPath Profiles

Legend: Consumed (orange), Remaining (blue), Resources prohibited (grey)

Name	Description	vCenter Server	Vendor
NVIDIA L4-6Q profile	DPP for L4-6Q profile	192.168.151.150	Nvidia
NVIDIA L4-2Q profile	DPP for L4-2Q profile	192.168.151.150	Nvidia
NEW -> NVIDIA L4-3B profile	NEW vGPU Profile in 19.0 DPP for L4-3B profile	192.168.151.150	Nvidia
NVIDIA L4-4Q profile	DPP for L4-4Q profile	192.168.151.150	Nvidia

Justin Murry's Blog: <https://blogs.vmware.com/cloud-foundation/2025/06/19/viewing-usage-capacity-for-virtual-gpus-in-vmware-cloud-foundation-9-0/>



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vGPU Utilization

DirectPath Profile Utilization

The screenshot shows the vSphere Client interface. In the left sidebar, the 'GPU Cluster' is selected under the 'Datacenter' view. The 'Monitor' tab is active in the top navigation bar. The main content area displays 'DirectPath Profiles Utilization'. A red box highlights the 'MANAGE DIRECTPATH PROFILES' button in the top right corner. Below this, a table shows the utilization of various DirectPath Profiles.

Name	Description	Consumed	Remaining	Maximum	Utilization	Vendor
NVIDIA L 4-4Q profile	DPP for L4-4 Q profile	0 instances	3 instances	4 instances	0/4	Nvidia
NEW --> N VIDIA L4-3B profile	NEW vGPU P rofile in 19.0 DPP for L4-3 B profile	1 instance	7 instances	8 instances	0/8	Nvidia
NVIDIA L 4-2Q profile	DPP for L4-2 Q profile	0 instances	7 instances	8 instances	0/8	Nvidia
NVIDIA L 4-6Q profile	DPP for L4-6 Q profile	0 instances	3 instances	4 instances	0/4	Nvidia

vGPU Utilization

DirectPath Profile Utilization

The screenshot displays the vSphere Client interface. On the left, the navigation pane shows the 'Policies and Profiles' section expanded, with 'DirectPath Profiles' selected. The main content area shows the 'DirectPath Profiles' configuration page. A red box highlights the 'Policies and Profiles' section in the left pane, and another red box highlights the 'DirectPath Profiles' option. The main content area includes a 'DirectPath Profiles' header, a description of the feature, and a table of profiles.

DirectPath Profiles

DirectPath Profiles can capture the configuration of any DirectPath passthrough device in vSphere. These DirectPath Profiles can be used across workflows, such as monitoring DirectPath virtual device utilization. Only named DirectPath Profiles will show up here. Get started by [creating a new DirectPath Profile](#).

☐ Don't show me this again

CREATE EDIT DELETE

	Name	Description	vCenter Server	Vendor
☐	NVIDIA L4-6Q profile	DPP for L4-6Q profile	192.168.151.150	Nvidia
☐	NVIDIA L4-2Q profile	DPP for L4-2Q profile	192.168.151.150	Nvidia
☐	NEW --> NVIDIA L4-3B profile	NEW vGPU Profile in 19.0 DPP for L4-3B profile	192.168.151.150	Nvidia
☒	NVIDIA L4-4Q profile	DPP for L4-4Q profile	192.168.151.150	Nvidia

☒ 1 4 items

DirectPath Profile Manager

Managed Object Browser

[Home] → Content → directPathProfileManager

[Home](#)[Logout](#)

Managed Object Type: ManagedObjectReference:DirectPathProfileManager
Managed Object ID: **DirectPathProfileMgr**

Properties

NAME	TYPE	VALUE
------	------	-------

Methods

RETURN TYPE	NAME
string	DirectPathProfileManagerCreate
void	DirectPathProfileManagerDelete
DirectPathProfileInfo[]	DirectPathProfileManagerList
DirectPathProfileManagerCapacityResult[]	DirectPathProfileManagerQueryCapacity
void	DirectPathProfileManagerUpdate

DirectPath Profiles in VCF PowerCLI

List all Profiles

#----- List all DPP specs -----

```
$DPP_MGR = Get-View -Id 'DirectPathProfileManager-DirectPathProfileMgr'
```

```
$Spec = New-Object VMware.Vim.DirectPathProfileManagerFilterSpec
```

```
$DPP_MGR.DirectPathProfileManagerList($Spec) #Set Profile
```

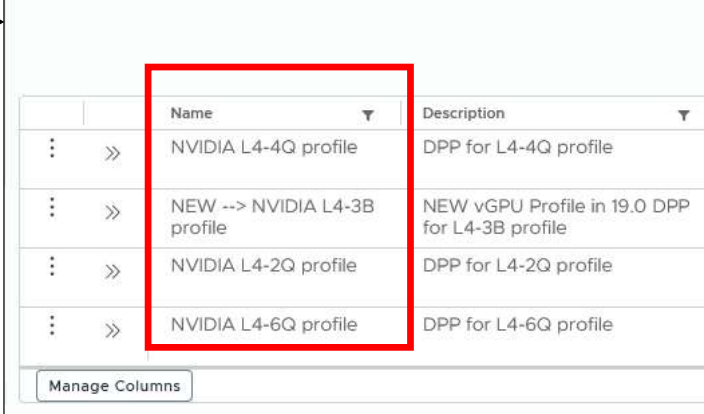
Output:

```
Id          : ucbsCQSDIl3CHG5b2WGDvfADuCUorM8t
Name        : NVIDIA L4-6Q profile
Description : DPP for L4-6Q profile
VendorName  : Nvidia
DeviceConfig : VMware.Vim.DirectPathProfileManagerVmiopDirectPathConfig
```

```
Id          : ibQrFoQHGzIfYVhQt9YZLTLyi2FYGnU
Name        : NVIDIA L4-2Q profile
Description : DPP for L4-2Q profile
VendorName  : Nvidia
DeviceConfig : VMware.Vim.DirectPathProfileManagerVmiopDirectPathConfig
```

```
Id          : LZYZJ1jfbn9zSli2xwatXrvO7FICWh+z
Name        : NEW --> NVIDIA L4-3B profile
Description : NEW vGPU Profile in 19.0
              DPP for L4-3B profile
VendorName  : Nvidia
DeviceConfig : VMware.Vim.DirectPathProfileManagerVmiopDirectPathConfig
```

...



	Name	Description
⋮ >>	NVIDIA L4-4Q profile	DPP for L4-4Q profile
⋮ >>	NEW --> NVIDIA L4-3B profile	NEW vGPU Profile in 19.0 DPP for L4-3B profile
⋮ >>	NVIDIA L4-2Q profile	DPP for L4-2Q profile
⋮ >>	NVIDIA L4-6Q profile	DPP for L4-6Q profile

Manage Columns

DirectPath Profiles in VCF PowerCLI

List Specific Profiles

```
#----- List select DPP specs -----
```

```
$DPP_MGR = Get-View -Id 'DirectPathProfileManager-DirectPathProfileMgr'
```

```
$Spec = New-Object VMware.Vim.DirectPathProfileManagerFilterSpec
```

```
$Spec.Names = 'NEW --> NVIDIA L4-3B profile' #Accepts single string or arrays
```

```
$DPP_MGR.DirectPathProfileManagerList($Spec) #Set Profile
```

Output:

```
Id          : LZYJZ1jfbn9zSli2xwatXrvO7FICWh+z
Name        : NEW --> NVIDIA L4-3B profile
Description : NEW vGPU Profile in 19.0
              DPP for L4-3B profile
VendorName  : Nvidia
DeviceConfig : VMware.Vim.DirectPathProfileManagerVmiopDirectPathConfig
```

	Name	Description
⋮	NVIDIA L4-4Q profile	DPP for L4-4Q profile
⋮	NEW --> NVIDIA L4-3B profile	NEW vGPU Profile in 19.0 DPP for L4-3B profile
⋮	NVIDIA L4-2Q profile	DPP for L4-2Q profile
⋮	NVIDIA L4-6Q profile	DPP for L4-6Q profile
Manage Columns		

DirectPath Profiles in VCF PowerCLI

List profile usage per cluster

```
$DPP_MGR = Get-View -Id 'DirectPathProfileManager-DirectPathProfileMgr'
$Spec = New-Object VMware.Vim.DirectPathProfileManagerFilterSpec
$Spec.Names = 'NEW --> NVIDIA L4-3B profile'
#vSphere Cluster
$Cluster_View = Get-View -ViewType ClusterComputeResource -Filter @{"Name" = "GPU Cluster"}
#DPP Cluster
$DPP_Target_Entity = new-object VMware.Vim.DirectPathProfileManagerTargetCluster
$DPP_Target_Entity.Cluster = $Cluster_View.MoRef
#Target
$DPP_QC = New-Object VMware.Vim.DirectPathProfileManagerCapacityQueryByName
$DPP_QC.Name = $Spec.Names
$DPP_MGR.DirectPathProfileManagerQueryCapacity($DPP_Target_Entity, $DPP_QC)
```

Arg 1

Arg 2

Arg 1

Arg 2

Output:

```
Profile      : VMware.Vim.DirectPathProfileInfo
Consumed     : 1
Remaining    : 7
Max          : 8
UnusedReservation : 0
```

DirectPath Profiles in VCF PowerCLI

List profile usage per host

```
$DPP_MGR = Get-View -Id 'DirectPathProfileManager-DirectPathProfileMgr'
$Spec = New-Object VMware.Vim.DirectPathProfileManagerFilterSpec
$Spec.Names = 'NEW --> NVIDIA L4-3B profile'
#vSphere Host
$Host_View = Get-View -ViewType HostSystem -Filter @{"Name" = "ESX04.wondererd.local"}
#DPP Host
$DPP_Target_Entity = new-object VMware.Vim.DirectPathProfileManagerTargetHost
$DPP_Target_Entity.Host = $Host_View.MoRef
#Target
$DPP_QC = New-Object VMware.Vim.DirectPathProfileManagerCapacityQueryByName
$DPP_QC.Name = $Spec.Names
$DPP_MGR.DirectPathProfileManagerQueryCapacity($DPP_Target_Entity, $DPP_QC)
```

Arg 1

Arg 2

Arg 1

Arg 2

Output:

```
Profile      : VMware.Vim.DirectPathProfileInfo
Consumed     : 1
Remaining    : 7
Max          : 8
UnusedReservation : 0
```


vSphere - GPU Cluster - Summ... Test config

192.168.151.150/ui/app/cluster;nav=h/urn:vmomi:ClusterComputeResource:domain-c10:8f72590d-b448-46dc-9286-0f690e3c9ddb/summary

vSphere Client Search in all environments Administrator@WONDERNERD.LAB

EXPLORER

- 192.168.151.150
 - Datacenter
 - GPU Cluster
 - esx04.wondernerd.local
 - VM_GPU_01
 - VM_GPU_02
 - VM_GPU_03
 - VM_GPU_04
 - VM_GPU_05
 - VM_GPU_06
 - VM_GPU_07
 - VM_GPU_08
 - VM_GPU_09

EXPLORE2025

- __pycache__
- .venv
- vcf-sdk-python
- 1.1_DPP_List_Profiles.ps1
- 1.2_DPP_Filter_Profiles.ps1
- 1.3_DPP_Get_Cluster_Usage.ps1
- 1.4_DPP_Get_Host_Usage.ps1
- 1.5_DPP_Usefulness.ps1
- 2.1_DPP_List_Profiles.py
- 2.2_DPP_Filter_Profiles.py
- 2.3_DPP_Get_Cluster_Usage.py
- Connection.ps1
- DirectPath_Profiles.py
- ServiceInstance.py

1.5_DPP_Usefulness.ps1 > ...

```
1 . .\Connection.ps1
2 #----- List DPP Stats on a host for a given spec -----
3 $DPP_MGR = Get-View -Id 'DirectPathProfileManager-DirectPathProfileMgr'
4 $Spec = New-Object VMware.Vim.DirectPathProfileManagerFilterSpec
5 $Spec.Names = 'NEW --> NVIDIA L4-3B profile' #Accepts blank, single, or arrays
6 #vSphere Host
7 $Host_View = Get-View -ViewType HostSystem -Filter @{"Name" = "ESX04.wondernerd.local"}
8 #DPP Host
9 $DPP_Target_Entity = new-object VMware.Vim.DirectPathProfileManagerTargetHost
10 $DPP_Target_Entity.Host = $Host_View.MoRef
11 #Target
12 $DPP_QC = New-Object VMware.Vim.DirectPathProfileManagerCapacityQueryByName
13 $DPP_QC.Name = $Spec.Names
14
15 #Priming Read
16 $DPP_Usage = $DPP_MGR.DirectPathProfileManagerQueryCapacity($DPP_Target_Entity, $DPP_QC)
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Machine=VirtualMachine-vm-3001/VMGuest=/

GuestId : ubuntu64Guest
ConfiguredGuestId : ubuntu64Guest
RuntimeGuestId : ubuntu64Guest
ToolsVersion : 12.3.5
ExtensionData : VMware.Vim.GuestInfo
GuestFamily : linuxGuest

The power state is: PoweredOn
The power state is: PoweredOff

(.venv) PS C:\Users\Tony\Documents\Explore2025>

Ln 15, Col 14 Spaces: 4 UTF-8 CRLF {} PowerShell

Recent Tasks Alarms

Task Name	Target
Initiate guest OS shutd own	VM_GPU_01
Initiate guest OS shutd own	VM_GPU_02
Initiate guest OS shutd own	VM_GPU_03

Manage Columns All More Tasks

Completed

WONDERNERD.LAB\Adminis 4 ms 08/23/2025, 9:22:19 PM 08/23/2025, 9:22:20 PM 192.168.151.150

Type here to search

9:27 PM 8/23/2025

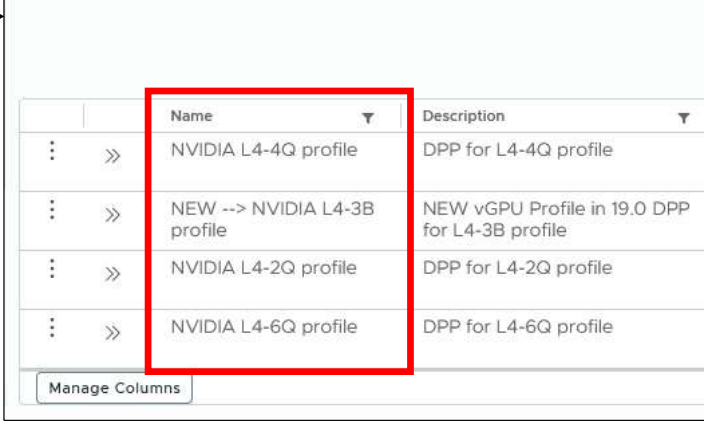
DirectPath Profiles in VCF Python SDK

List all Profiles

```
si = SmartConnect(host=<>, user=<>, pwd=<>, session)
#----- List all DPP specs -----
DPP_MGR = si.content.directPathProfileManager
Filter_Spec = vim.DirectPathProfileManager.FilterSpec()
print(DPP_MGR.ListDirectPathProfiles(Filter_Spec)) #Set Profile
```

Output:

```
(vim.DirectPathProfileManager.DirectPathProfileInfo) [
  (vim.DirectPathProfileManager.DirectPathProfileInfo) {
    dynamicType = <unset>,
    dynamicProperty = (vmopl.DynamicProperty) [],
    id = 'ucbsCQSDIl3CHG5b2WGDvfADuCUorM8t',
    name = 'NVIDIA L4-6Q profile',
    description = 'DPP for L4-6Q profile ',
    vendorName = 'Nvidia',
    deviceConfig = (vim.DirectPathProfileManager.VmiopDirectPathConfig)
      dynamicType = <unset>,
      dynamicProperty = (vmopl.DynamicProperty) [],
      vgpuProfile = 'nvidia_l4-6q'
  },
  ...
]
```



	Name	Description
⋮	NVIDIA L4-4Q profile	DPP for L4-4Q profile
⋮	NEW --> NVIDIA L4-3B profile	NEW vGPU Profile in 19.0 DPP for L4-3B profile
⋮	NVIDIA L4-2Q profile	DPP for L4-2Q profile
⋮	NVIDIA L4-6Q profile	DPP for L4-6Q profile

Manage Columns

DirectPath Profiles in VCF Python SDK

List Specific Profiles

```
#----- List all DPP specs -----
```

```
DPP_MGR = si.content.directPathProfileManager
```

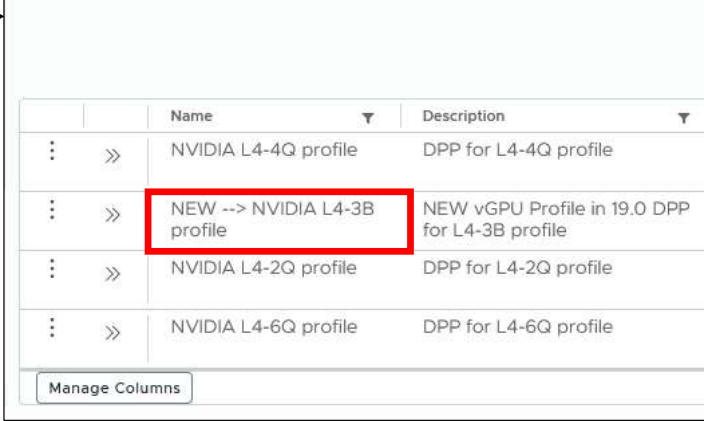
```
Filter_Spec = vim.DirectPathProfileManager.FilterSpec()
```

```
Filter_Spec.names = "NEW --> NVIDIA L4-3B profile"
```

```
print(DPP_MGR.ListDirectPathProfiles(Filter_Spec)) #Set Profile
```

Output:

```
(vim.DirectPathProfileManager.DirectPathProfileInfo) [  
  (vim.DirectPathProfileManager.DirectPathProfileInfo) {  
    dynamicType = <unset>,  
    dynamicProperty = (vmobl.DynamicProperty) [],  
    id = 'LZYJZl1jfbn9zSli2xwatXrvO7FICWh+z',  
    name = 'NEW --> NVIDIA L4-3B profile',  
    description = 'NEW vGPU Profile in 19.0 \nDPP for L4-3B profile',  
    vendorName = 'Nvidia',  
    deviceConfig = (vim.DirectPathProfileManager.VmiopDirectPathConfig)  
      dynamicType = <unset>,  
      dynamicProperty = (vmobl.DynamicProperty) [],  
      vgpuProfile = 'nvidia_l4-3b'  
  }  
]  
...
```



	Name	Description
⋮	NVIDIA L4-4Q profile	DPP for L4-4Q profile
⋮	NEW --> NVIDIA L4-3B profile	NEW vGPU Profile in 19.0 DPP for L4-3B profile
⋮	NVIDIA L4-2Q profile	DPP for L4-2Q profile
⋮	NVIDIA L4-6Q profile	DPP for L4-6Q profile

Manage Columns

DirectPath Profiles in VCF Python SDK

List profile usage per cluster

```
DPP_MGR = si.content.directPathProfileManager
Filter_Spec = vim.DirectPathProfileManager.FilterSpec()
Filter_Spec.names = "NEW --> NVIDIA L4-3B profile"
#vSphere Cluster
Entity_Ref = si.content.viewManager.CreateContainerView(si.content.rootFolder,
    [vim.ClusterComputeResource], True) #Iterate with loop to find desired cluster
#DPP Cluster
DPP_Target_Entity = vim.DirectPathProfileManager.TargetCluster
DPP_Target_Entity.cluster = Entity_Ref
#Target
DPP_QC = vim.DirectPathProfileManager.CapacityQueryByName
DPP_QC.name = Filter_Spec.names
Print(DPP_MGR.QueryDirectPathProfileCapacity(DPP_Target_Entity, DPP_QC))
```

Output:

```
File "C:\Users\Tony\Documents\Explore2025\.venv\Lib\site-packages\pyVmomi\VmomiSupport.py", line
1169, in CheckField
```

```
    raise TypeError('For "%s" expected type %s, but got %s' %
                    (info.name, info.type.__name__, valType.__name__))
```

```
TypeError: For "target" expected type vim.DirectPathProfileManager.TargetEntity, but got LazyType
```

Other Functions to Explore

vGPU Monitoring

vMotion Stun Time

- VmDevicesStunTimeTolerated (PowerCLI / Python)
- <https://techdocs.broadcom.com/us/en/vmware-cis/vsphere/vsphere/9-0/using-vmotion-to-migrate-vgpu-virtual-machines.html>
- <https://developer.broadcom.com/xapis/vsphere-web-services-api/9.0/vim.vm.VMotionStunTimeInfo.html>

PassthroughDrsAutomation

MixedSize vGPU

- <https://developer.broadcom.com/xapis/vsphere-web-services-api/9.0/vim.host.GraphicsInfo.VgpuMode.html?scrollString=mixedsize>
- <https://docs.nvidia.com/vgpu/sizing/virtual-workstation/latest/methodology.html>

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your survey.

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Visit my website [@ wondernerd.net](#)

Meet me at the VMware {code} Hackathon
tonight at 19:00 to 23:55



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Thank You