

HDDL-R Hyper-V Enabling User Guide

Hardware Requirements:

Intel® CPU with VT-d support

IEI Mustang-V100-MX8 HDDL-R Rev1.0 or IEI Mustang-V100-MX8-R11 Rev 1.1

Software Requirements:

Windows Server 2019 (1809) version 17763.737

Hyper-V 10.0.17763.1

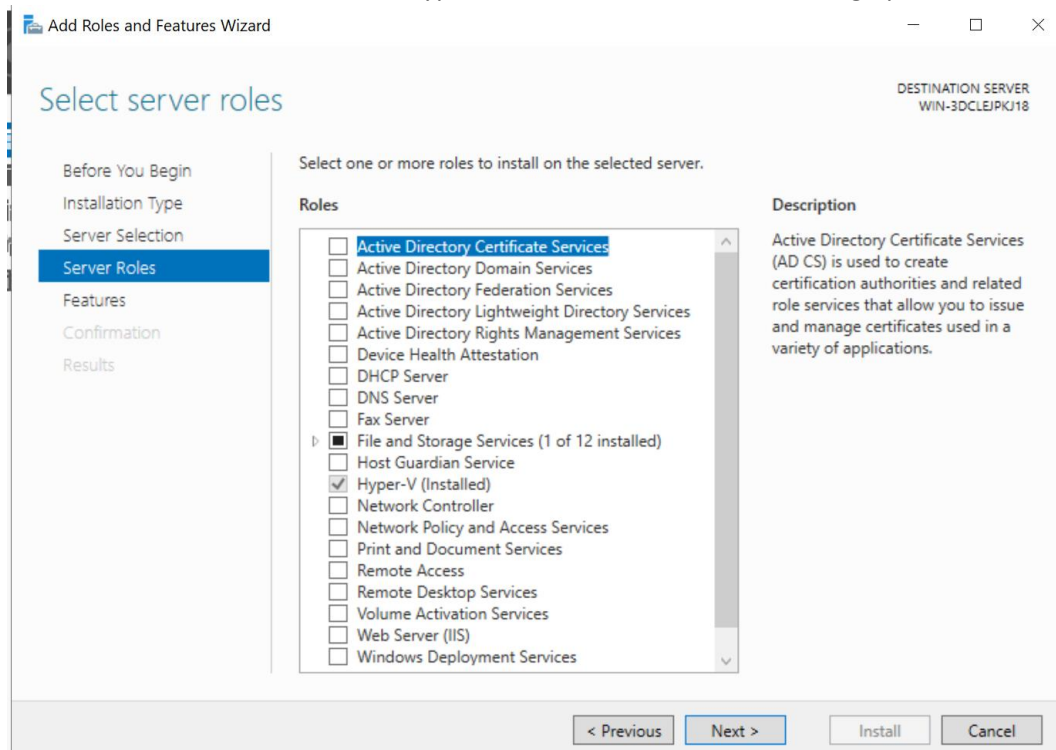
Ubuntu 18.04 as Guest OS kernel version 5.4.0-86-generic

OpenVINO 2021 R4

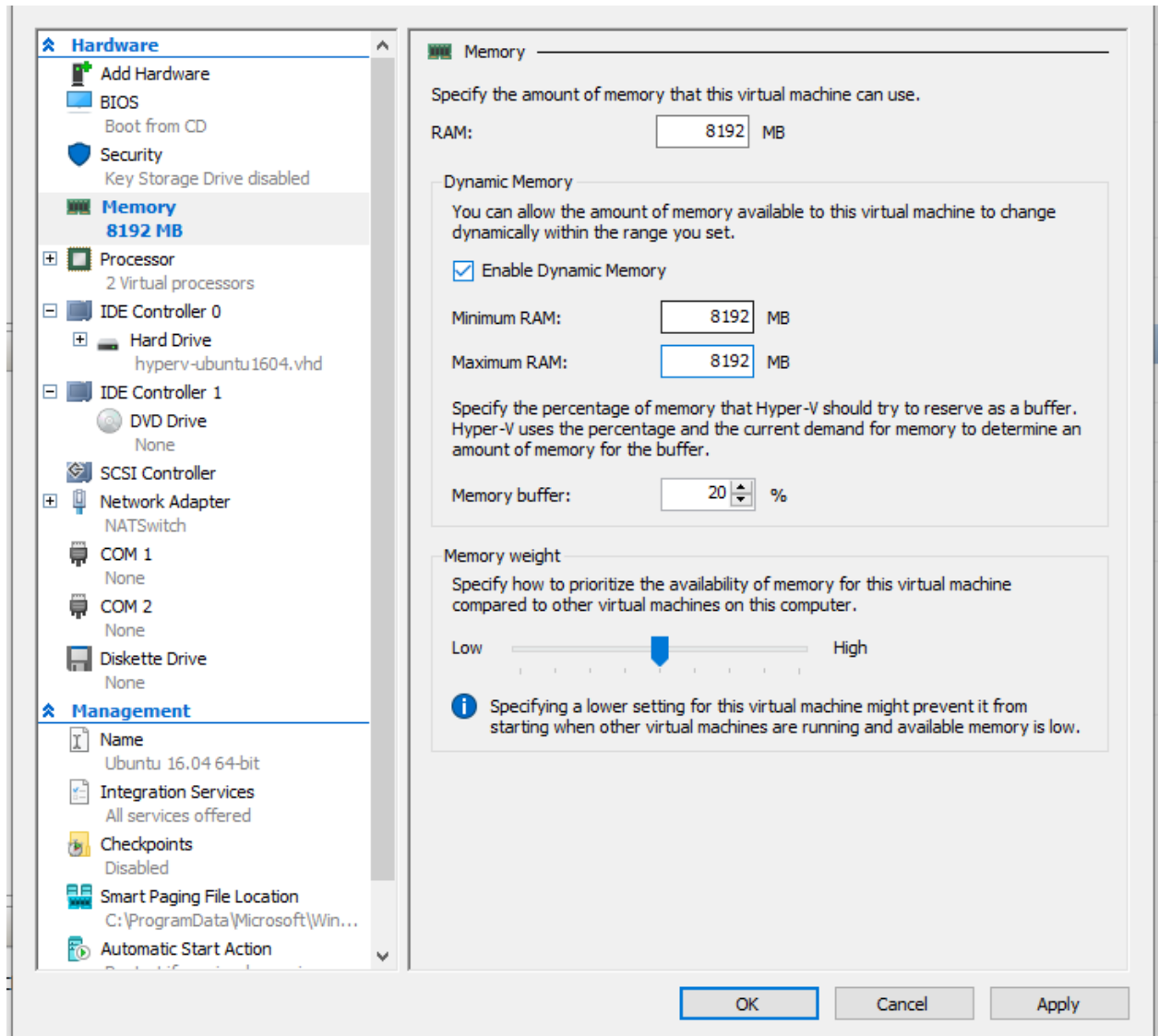
IEI HDDL-R plugin https://dls.ieiworld.com/IEIWeb/PDC_APP/PLM/OWFP000269/Mustang-V100_Linux_Plugin_1.0.3.20200212.tar.gz

Install Ubuntu 18.04 in Hyper-V

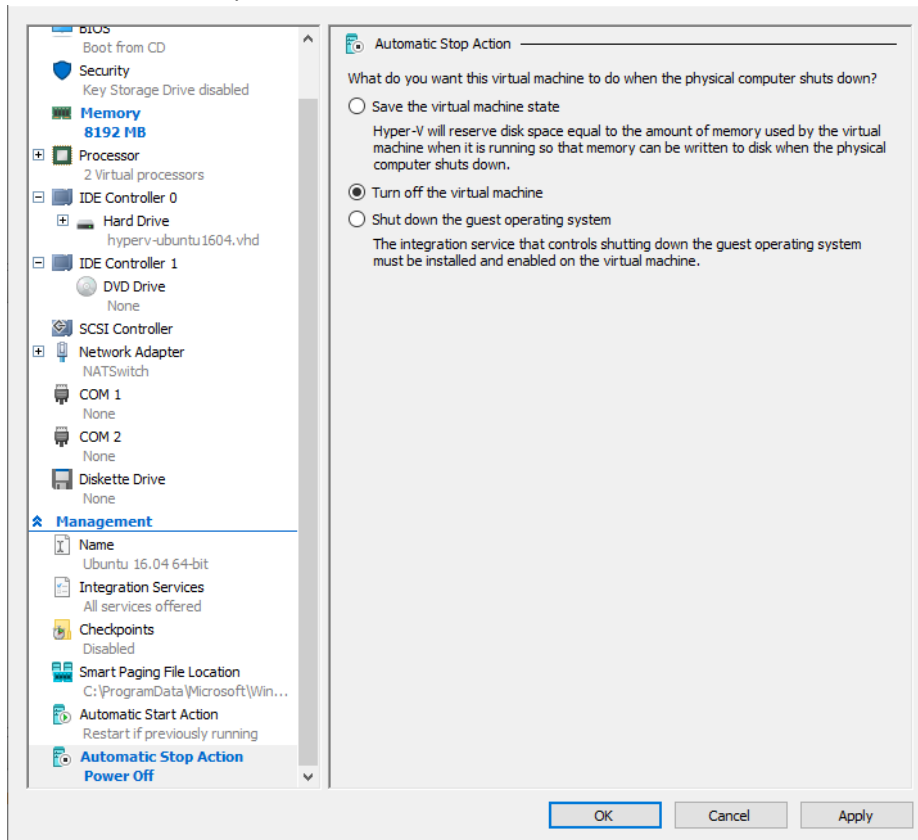
1. Install Windows Server 2019 and Hyper-V via Windows feature enabling option.



2. Create VM and install Ubuntu 18.04 as VM.
3. If Dynamic Memory is enabled in VM, either disable or set Minimum RAM and Maximum RAM to same amount.

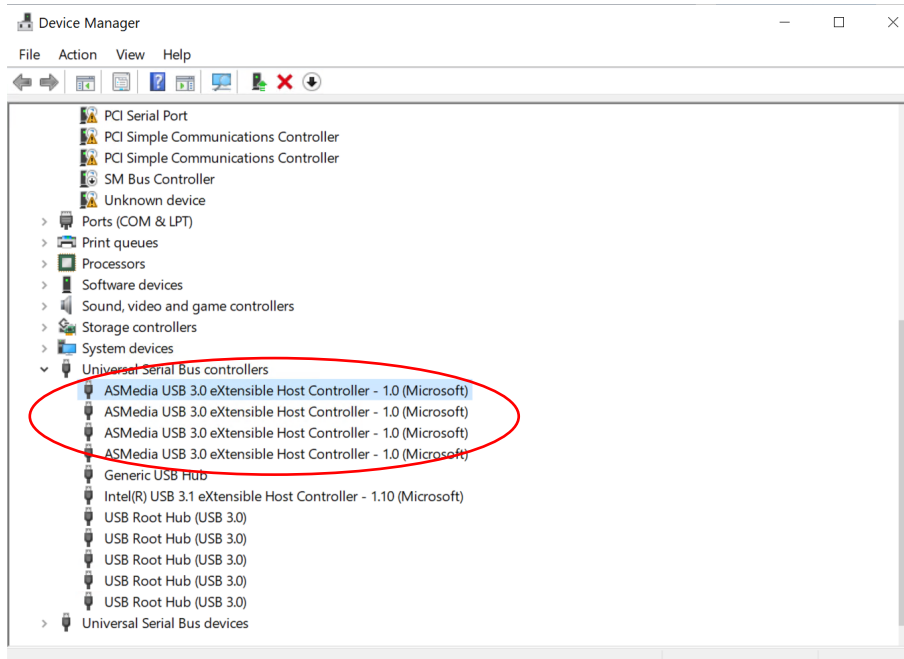


4. Set “Automatic Stop Action” to “Turn off the virtual machine”

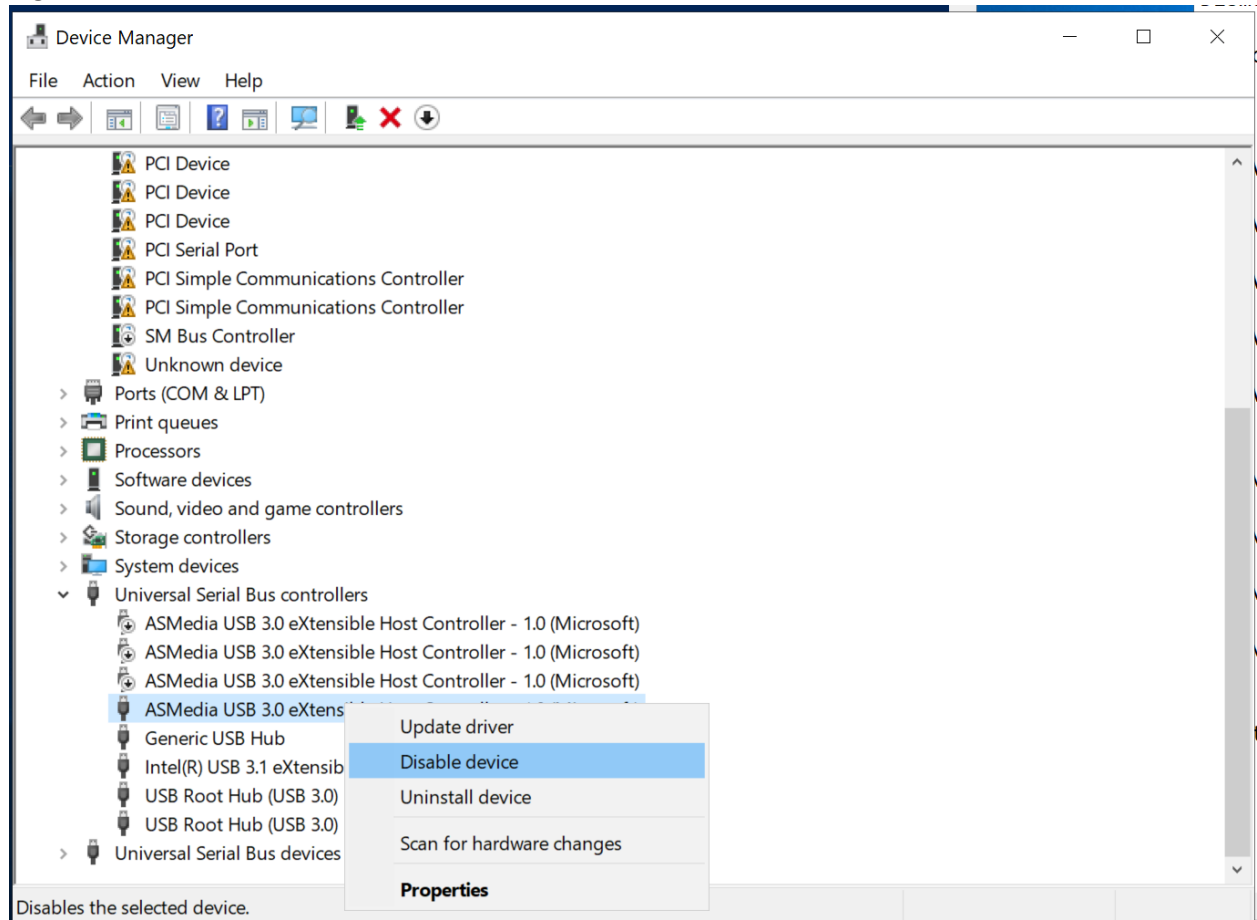


Preparing VT-d passthrough in Host

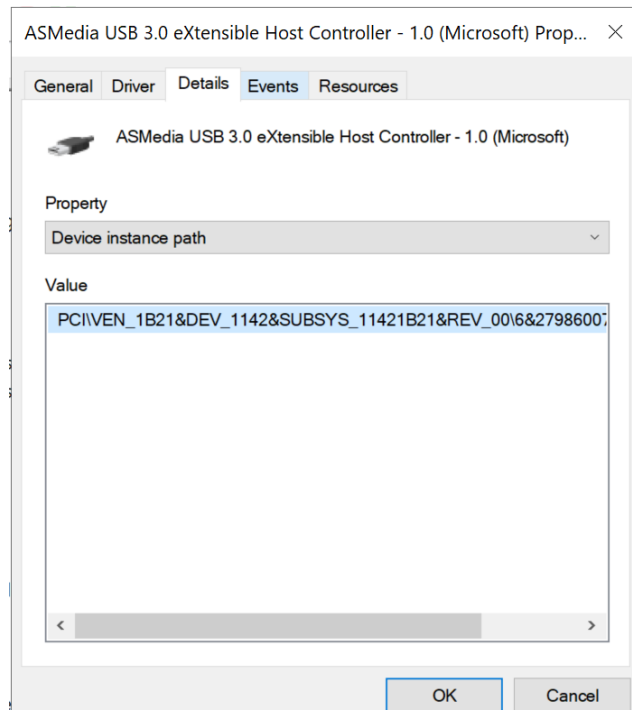
1. Look for “ASMedia 3.0 USB Controller” in Device Manager, there should be 4 devices visible.



2. Right click and click “Disable” to all 4 “ASMedia USB 3.0 eXtensible Host Controller”.



3. Take note of the Hardware ID of all 4 “ASMedia USB Controller”.



4. In Windows PowerShell, dismount all 4 ASMedia USB controllers from host. Use “Dismount-VMHostAssignableDevice -force “<Hardware ID>” for all 4 devices.

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> Dismount-VMHostAssignableDevice -force "PCI\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&2798607&0&001800E8"
PS C:\Users\Administrator> Dismount-VMHostAssignableDevice -force "PCI\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&3A7D8551&0&001000E8"
PS C:\Users\Administrator> Dismount-VMHostAssignableDevice -force "PCI\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&292A8DC&0&005800E8"
PS C:\Users\Administrator> Dismount-VMHostAssignableDevice -force "PCI\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&23E87275&0&005000E8"
PS C:\Users\Administrator> _
```

5. Type “Get-VMHostAssignableDevice” to ensure the devices are dismounted from host.

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> Get-VMHostAssignableDevice

InstanceID : PCIP\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&23E87275&0&005000E8
LocationPath : PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0A00)#PCI(0000)
CimSession : CimSession: .
ComputerName : WIN-3DCLEJPKJ18
IsDeleted : False

InstanceID : PCIP\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&2798607&0&001800E8
LocationPath : PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0300)#PCI(0000)
CimSession : CimSession: .
ComputerName : WIN-3DCLEJPKJ18
IsDeleted : False

InstanceID : PCIP\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&292A8DC&0&005800E8
LocationPath : PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0B00)#PCI(0000)
CimSession : CimSession: .
ComputerName : WIN-3DCLEJPKJ18
IsDeleted : False

InstanceID : PCIP\VEN_1B21&DEV_1142&SUBSYS_11421B21&REV_00\6&3A7D8551&0&001000E8
LocationPath : PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0200)#PCI(0000)
CimSession : CimSession: .
ComputerName : WIN-3DCLEJPKJ18
IsDeleted : False

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

6. With the VM off, assign these 4 devices to the VM.

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> Add-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0A00)#PCI(0000)" -VMName "Ubuntu18.04"
PS C:\Users\Administrator> Add-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0300)#PCI(0000)" -VMName "Ubuntu18.04"
PS C:\Users\Administrator> Add-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0B00)#PCI(0000)" -VMName "Ubuntu18.04"
PS C:\Users\Administrator> Add-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0200)#PCI(0000)" -VMName "Ubuntu18.04"
PS C:\Users\Administrator> _
```

7. VM is ready and the devices are associated with VM “Ubuntu18.04” by now.

Start VM and install OpenVINO

1. Start VM with Ubuntu 18.04 as guest OS.
2. Install OpenVINO by following guide from https://docs.openvino toolkit.org/latest/openvino_docs_install_guides_installing_openvino_linux.html
3. Install HDDL-R prerequisite and drivers.
4. (Optional for IEI Mustang-V100-MX8 Rev 1.0) If your HDDL-R card is IEI Mustang Rev 1.0, the USB HID device is MSP430-USB different from Rev 1.1 and requires additional drivers from here: https://dls.ieiworld.com/IEIWeb/PDC_APP/PLM/OWFP000269/Mustang-V100_Linux_Plugin_1.0.3.20200212.tar.gz
5. Verify "ASMedia controllers" are being pass-through into the VM by using "lspci".

```
ubuntu-vm@ubuntuvm-Virtual-Machine: ~  
File Edit View Search Terminal Help  
ubuntu-vm@ubuntuvm-Virtual-Machine:~$ lspci  
0f02:00:00.0 USB controller: ASMedia Technology Inc. ASM1042A USB 3.0 Host Controller  
481d:00:00.0 USB controller: ASMedia Technology Inc. ASM1042A USB 3.0 Host Controller  
4df6:00:00.0 USB controller: ASMedia Technology Inc. ASM1042A USB 3.0 Host Controller  
d89e:00:00.0 USB controller: ASMedia Technology Inc. ASM1042A USB 3.0 Host Controller  
ubuntu-vm@ubuntuvm-Virtual-Machine:~$
```

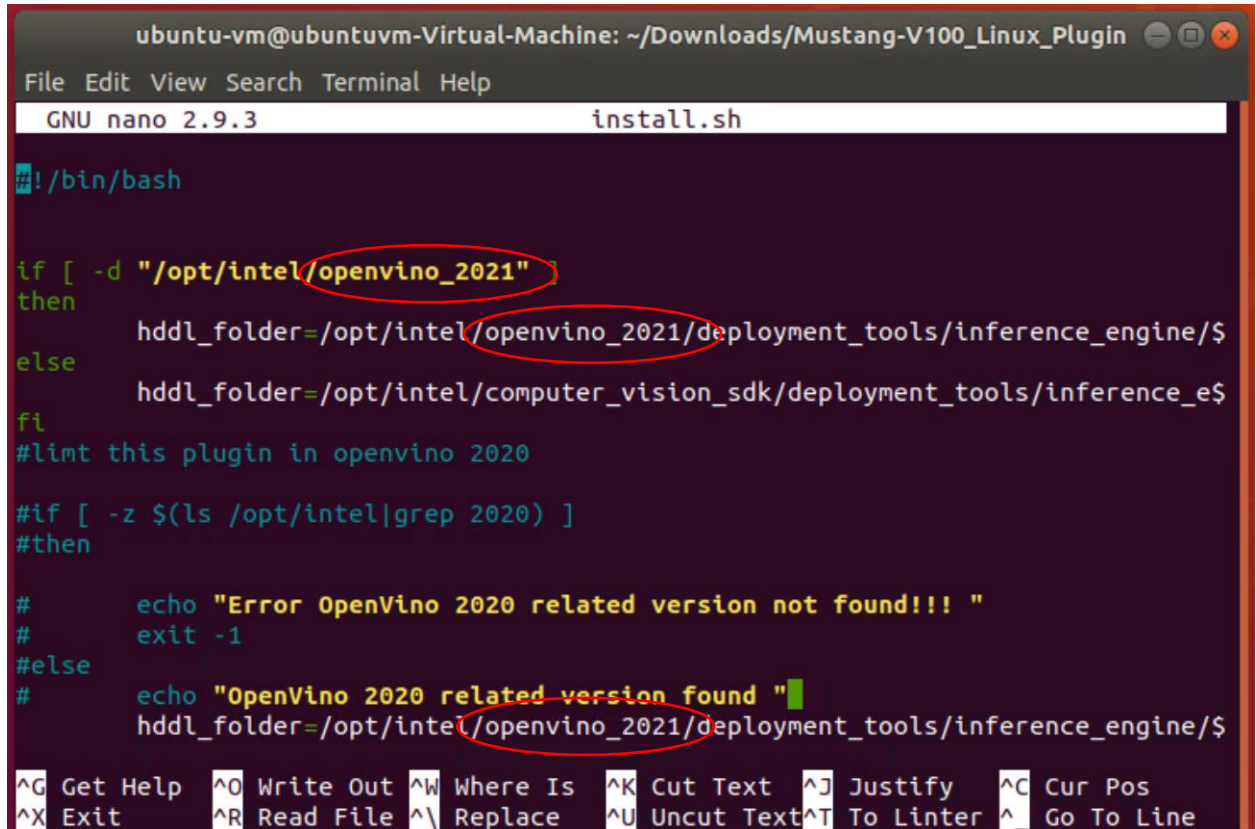
6. Verify all Movidius X USB devices is also visible in the VM by using "lsusb".

```
ubuntu-vm@ubuntuvm-Virtual-Machine: ~  
File Edit View Search Terminal Help  
ubuntu-vm@ubuntuvm-Virtual-Machine:~$ lsusb  
Bus 008 Device 005: ID 03e7:f63b  
Bus 008 Device 004: ID 03e7:f63b  
Bus 008 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 007 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub  
Bus 002 Device 005: ID 03e7:f63b  
Bus 002 Device 004: ID 03e7:f63b  
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 001 Device 005: ID 2933:f541  
Bus 001 Device 002: ID 05e3:0608 Genesys Logic, Inc. Hub  
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub  
Bus 006 Device 005: ID 03e7:f63b  
Bus 006 Device 004: ID 03e7:f63b  
Bus 006 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 005 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub  
Bus 004 Device 004: ID 03e7:f63b  
Bus 004 Device 005: ID 03e7:f63b  
Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub  
ubuntu-vm@ubuntuvm-Virtual-Machine:~$
```


7. Identify if your Mustang-V100-MX8 card is Rev 1.0 or 1.1.



8. (Optional for Mustang-V100-MX8 Rev 1.0) To support OpenVINO 2021, the additional package downloaded from IEL website needs to be modified, from “openvino” to “openvino_2021” as below:



```
ubuntu-vm@ubuntuvm-Virtual-Machine: ~/Downloads/Mustang-V100_Linux_Plugin
File Edit View Search Terminal Help
GNU nano 2.9.3 install.sh

#!/bin/bash

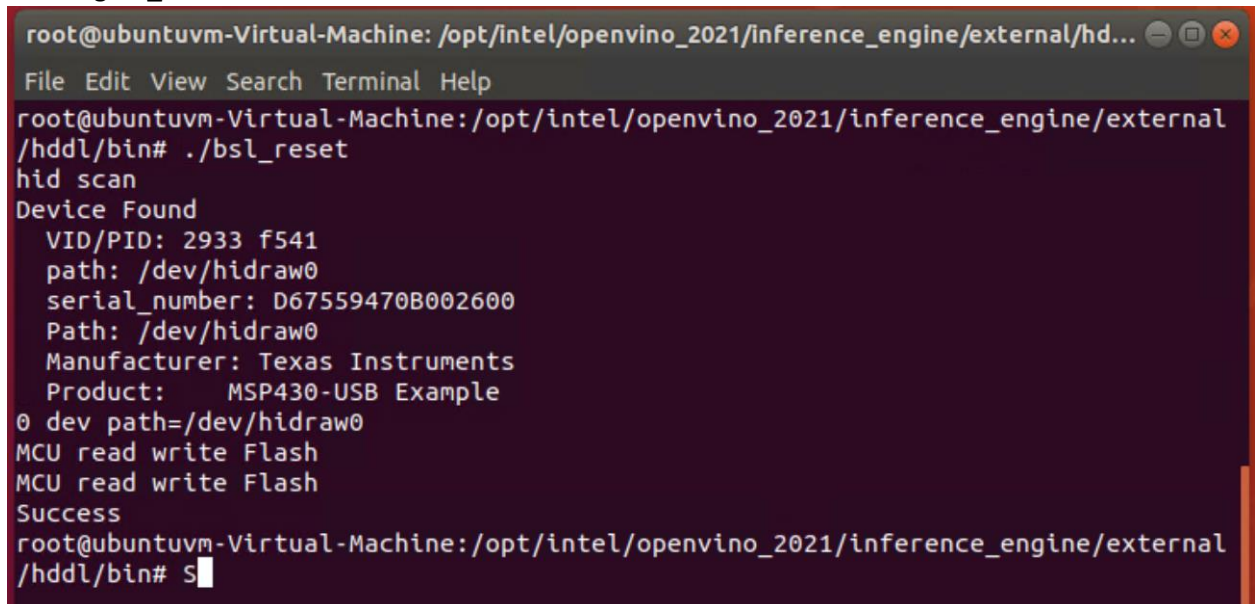
if [ -d "/opt/intel/openvino_2021" ]
then
    hddl_folder=/opt/intel/openvino_2021/deployment_tools/inference_engine/$
else
    hddl_folder=/opt/intel/computer_vision_sdk/deployment_tools/inference_e$
fi
#limit this plugin in openvino 2020

#if [ -z $(ls /opt/intel|grep 2020) ]
#then

#     echo "Error OpenVino 2020 related version not found!!! "
#     exit -1
#else
#     echo "OpenVino 2020 related version found "
#     hddl_folder=/opt/intel/openvino_2021/deployment_tools/inference_engine/$

^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify  ^C Cur Pos
^X Exit      ^R Read File ^\ Replace   ^U Uncut Text ^T To Linter ^_ Go To Line
```

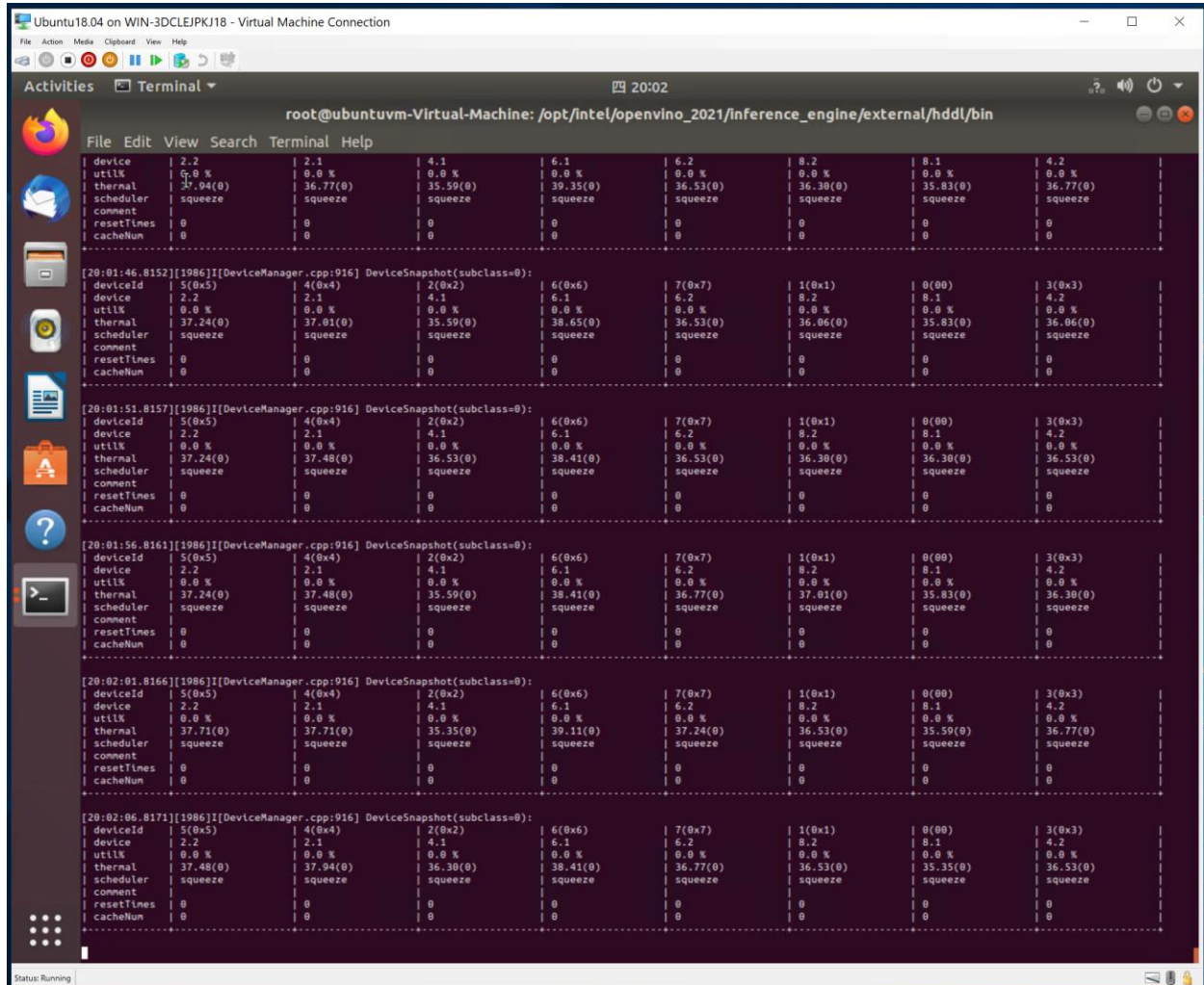
9. (Optional for Mustang-V100-MX8 Rev 1.0) Make sure the newly installed plugin works by invoking bsl_reset.



```
root@ubuntuvm-Virtual-Machine: /opt/intel/openvino_2021/inference_engine/external/hd...
File Edit View Search Terminal Help
root@ubuntuvm-Virtual-Machine: /opt/intel/openvino_2021/inference_engine/external
/hddl/bin# ./bsl_reset
hid scan
Device Found
VID/PID: 2933 f541
path: /dev/hidraw0
serial_number: D67559470B002600
Path: /dev/hidraw0
Manufacturer: Texas Instruments
Product: MSP430-USB Example
0 dev path=/dev/hidraw0
MCU read write Flash
MCU read write Flash
Success
root@ubuntuvm-Virtual-Machine: /opt/intel/openvino_2021/inference_engine/external
/hddl/bin# S
```


Executing OpenVINO sample applications with HDDL-R card

1. Initialize OpenVINO environment and start “hddldaemon”, verify it is working.



The screenshot shows a terminal window titled "Ubuntu18.04 on WIN-3DCLEJPKJ18 - Virtual Machine Connection". The terminal is running a command that outputs device snapshots from the OpenVINO inference engine. The snapshots are organized into groups, each preceded by a timestamp and a log message. Each snapshot contains a table of device metrics.

Terminal Title: Ubuntu18.04 on WIN-3DCLEJPKJ18 - Virtual Machine Connection

Terminal Path: root@ubuntuvirtual-machine: /opt/intel/openvino_2021/inference_engine/external/hddl/bin

Terminal Output:

```
[20:01:46.8152][1986][DeviceManager.cpp:916] DeviceSnapshot(subclass=0):
| device | 2.2 | 2.1 | 4.1 | 6.1 | 6.2 | 8.2 | 8.1 | 4.2 |
| util%  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| thermal | 37.94(0) | 36.77(0) | 35.59(0) | 39.35(0) | 36.53(0) | 36.30(0) | 35.83(0) | 36.77(0) |
| scheduler | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze |
| comment | | | | | | | | |
| resetTimes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cacheNum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

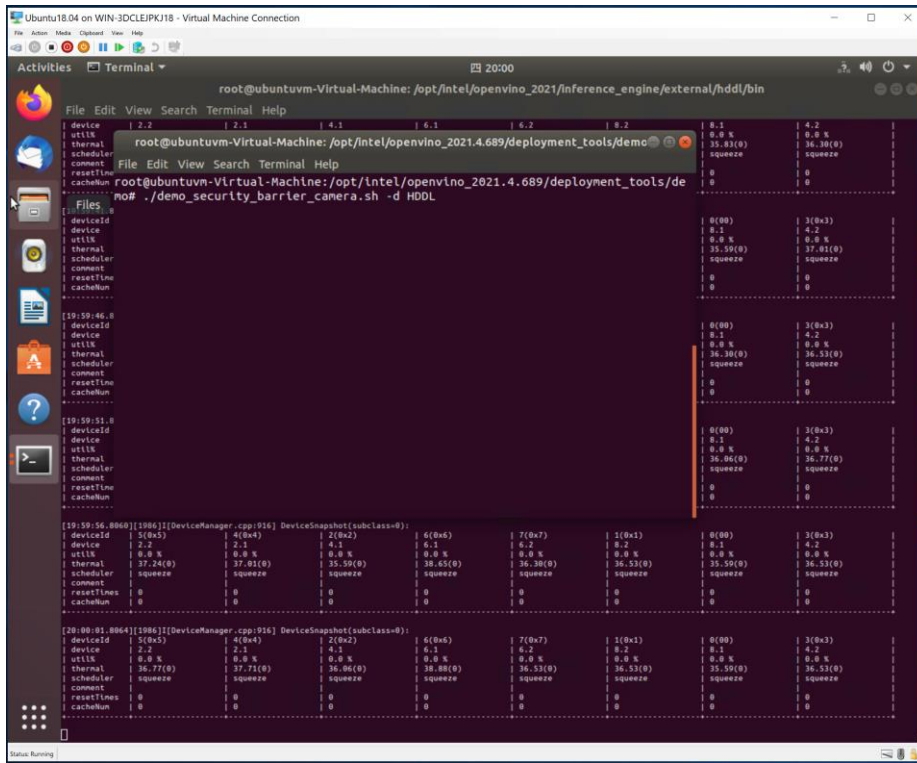
[20:01:51.8157][1986][DeviceManager.cpp:916] DeviceSnapshot(subclass=0):
| device | 2.2 | 2.1 | 4.1 | 6.1 | 6.2 | 8.2 | 8.1 | 4.2 |
| util%  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| thermal | 37.24(0) | 37.01(0) | 35.59(0) | 38.65(0) | 36.53(0) | 36.06(0) | 35.83(0) | 36.06(0) |
| scheduler | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze |
| comment | | | | | | | | |
| resetTimes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cacheNum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

[20:01:56.8161][1986][DeviceManager.cpp:916] DeviceSnapshot(subclass=0):
| device | 2.2 | 2.1 | 4.1 | 6.1 | 6.2 | 8.2 | 8.1 | 4.2 |
| util%  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| thermal | 37.24(0) | 37.48(0) | 35.59(0) | 38.41(0) | 36.77(0) | 37.01(0) | 35.83(0) | 36.30(0) |
| scheduler | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze |
| comment | | | | | | | | |
| resetTimes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cacheNum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

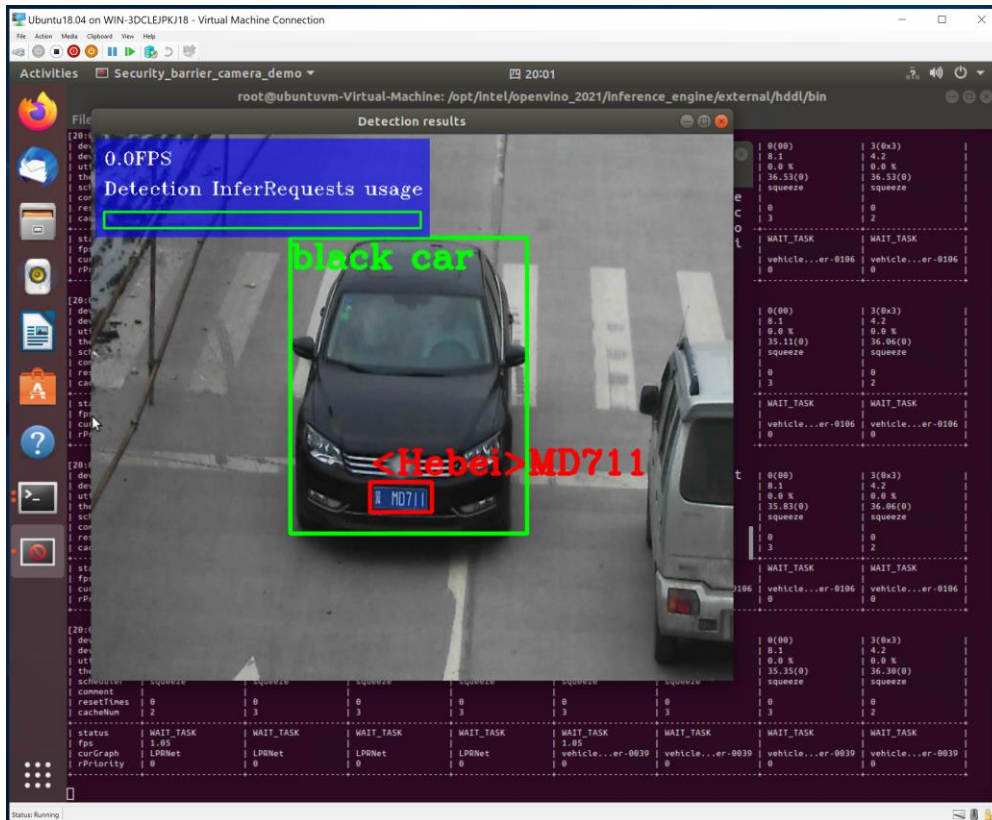
[20:02:01.8166][1986][DeviceManager.cpp:916] DeviceSnapshot(subclass=0):
| device | 2.2 | 2.1 | 4.1 | 6.1 | 6.2 | 8.2 | 8.1 | 4.2 |
| util%  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| thermal | 37.71(0) | 37.71(0) | 35.35(0) | 39.11(0) | 37.24(0) | 36.53(0) | 35.59(0) | 36.77(0) |
| scheduler | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze |
| comment | | | | | | | | |
| resetTimes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cacheNum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

[20:02:06.8171][1986][DeviceManager.cpp:916] DeviceSnapshot(subclass=0):
| device | 2.2 | 2.1 | 4.1 | 6.1 | 6.2 | 8.2 | 8.1 | 4.2 |
| util%  | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| thermal | 37.48(0) | 37.94(0) | 36.30(0) | 38.41(0) | 36.77(0) | 36.53(0) | 35.35(0) | 36.53(0) |
| scheduler | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze | squeeze |
| comment | | | | | | | | |
| resetTimes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cacheNum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
```

2. Run “demo_security_barrier_camera.sh -d HDDL”



3. Notice the hddldaemon print-out has CNN models loaded indicate HDDL-R is being utilized.



Shutting down VM and re-mount devices to host

1. After VM is being shut down, remove devices from VM using Remove-VMAssignableDevice.

```
Remove-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0A00)#PCI(0000)" -VMName "Ubuntu18.04"
```

```
Remove-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0300)#PCI(0000)" -VMName "Ubuntu18.04"
```

```
Remove-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0B00)#PCI(0000)" -VMName "Ubuntu18.04"
```

```
Remove-VMAssignableDevice -locationpath "PCIROOT(0)#PCI(1D00)#PCI(0000)#PCI(0200)#PCI(0000)" -VMName "Ubuntu18.04"
```

2. Use "Mount-VMHostAssignableDevice" to return all dismounted devices to host.
3. Verify "ASMedia 3.0 USB Controller" are attached to host.

