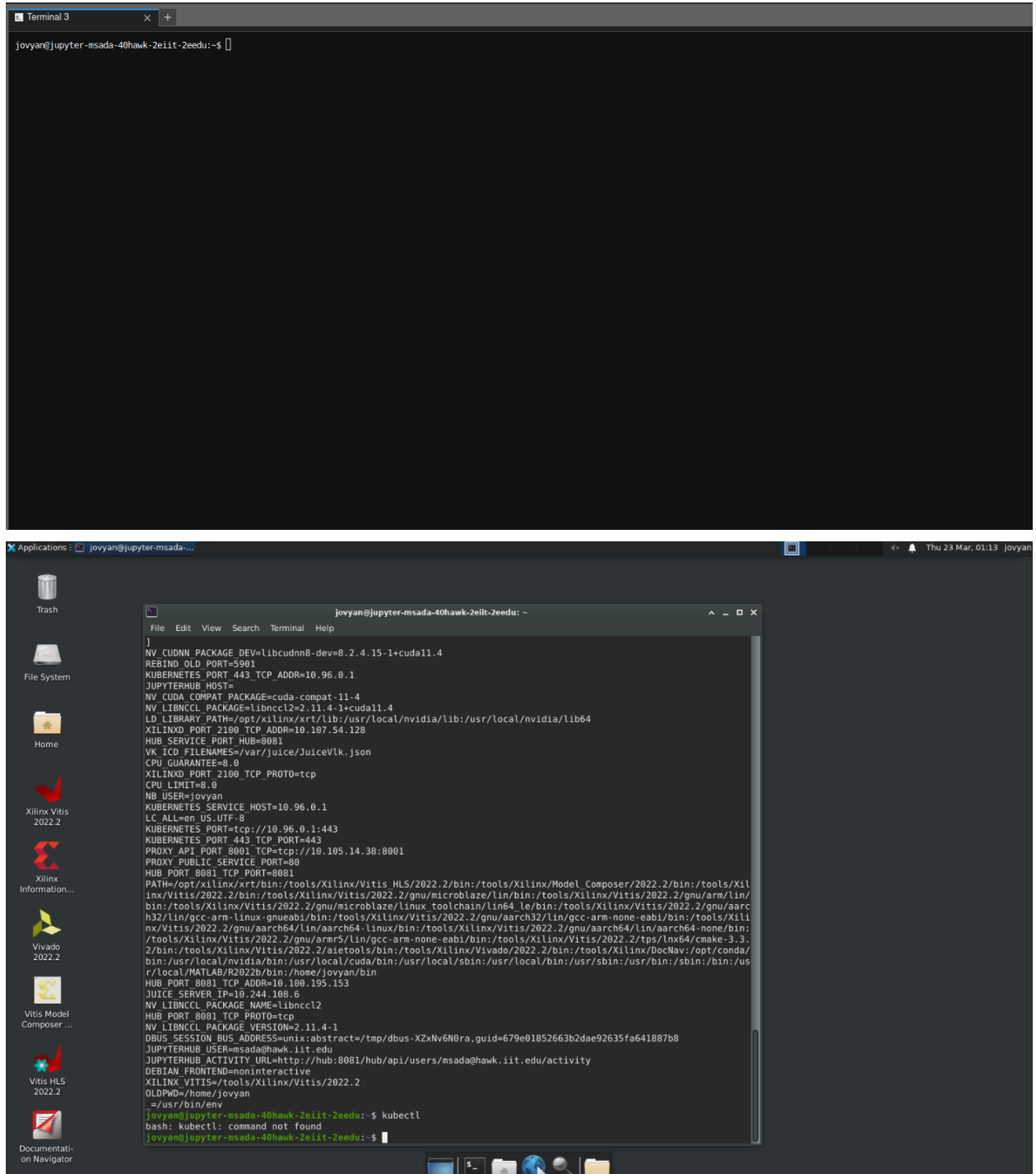


Description of attempt to run ESnet's set up on PRP's U55 Cluster.

March 22, 2023

Email: msada@hawk.iit.edu

- Access is through JupyterLab Hub



The screenshot displays a JupyterLab environment. On the left, a sidebar shows the file system with icons for Trash, File System, Home, and various application icons including Xilinx Vitis 2022.2, Xilinx Information..., Vivado 2022.2, Vitis Model Composer..., Vitis HLS 2022.2, and Documentation Navigator. The main area contains a terminal window titled 'Terminal 3' with the prompt 'jovyan@jupyter-msada-40hawk-2e1it-2eedu:~\$'. Below this, a larger terminal window shows the output of a 'cat' command, displaying a complex set of environment variables and configuration settings for Xilinx Vitis, including paths, ports, and user information. The terminal output includes:

```
jovyan@jupyter-msada-40hawk-2e1it-2eedu:~$ cat ./.env
]
NV_CUDA_PACKAGE_DEV=libcudnn8-dev=8.2.4.15-1+cuda11.4
REBIND_OLD_PORT=5901
KUBERNETES_PORT_443_TCP_ADDR=10.96.0.1
JUPYTERHUB_HOST=
NV_CUDA_COMPAT_PACKAGE=cuda-compat-11.4
NV_LIBNCCL_PACKAGE=libnccl2=2.11.4-1+cuda11.4
LD_LIBRARY_PATH=/opt/xilinx/xrt/lib:/usr/local/nvidia/lib:/usr/local/nvidia/lib64
XILINX_PORT_2100_TCP_ADDR=10.107.54.128
HUB_SERVICE_PORT_HUB=8001
VK_ICD_FILENAMES=/var/juice/juiceVlk.json
CPU_GUARANTEE=8.0
XILINX_PORT_2100_TCP_PROTO=tcp
CPU_LIMIT=8.0
NB_USER=jovyan
KUBERNETES_SERVICE_HOST=10.96.0.1
LC_ALL=en_US.UTF-8
KUBERNETES_PORT=tcp://10.96.0.1:443
KUBERNETES_PORT_443_TCP_PORT=443
PROXY_API_PORT_8001_TCP=tcp://10.105.14.38:8001
PROXY_PUBLIC_SERVICE_PORT=80
HUB_PORT_8001_TCP_PORT=8001
PATH=/opt/xilinx/xrt/bin:/tools/Xilinx/Vitis_HLS/2022.2/bin:/tools/Xilinx/Model Composer/2022.2/bin:/tools/Xil
inx/Vitis/2022.2/bin:/tools/Xilinx/Vitis/2022.2/gnu/microblaze/lin/bin:/tools/Xilinx/Vitis/2022.2/gnu/arm/lin/
bin:/tools/Xilinx/Vitis/2022.2/gnu/microblaze/linux_toolchain/lin64_le/bin:/tools/Xilinx/Vitis/2022.2/gnu/aarc
h32/lin/gcc-arm-linux-gnueabi/bin:/tools/Xilinx/Vitis/2022.2/gnu/aarch32/lin/gcc-arm-none-eabi/bin:/tools/Xili
nx/Vitis/2022.2/gnu/aarch64/lin/aarch64-linux/bin:/tools/Xilinx/Vitis/2022.2/gnu/aarch64/lin/aarch64-none/bin/
:/tools/Xilinx/Vitis/2022.2/gnu/arm5/lin/gcc-arm-none-eabi/bin:/tools/Xilinx/Vitis/2022.2/tp/lin64/cmake-3.3.
2/bin:/tools/Xilinx/Vitis/2022.2/sdctools/bin:/tools/Xilinx/Vivado/2022.2/bin:/tools/Xilinx/DocNav:/opt/conda/
bin:/usr/local/nvidia/bin:/usr/local/cuda/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/us
r/local/MATLAB/R2022b/bin:/home/jovyan/bin
HUB_PORT_8001_TCP_ADDR=10.100.195.153
JUICE_SERVER_IP=10.244.108.6
NV_LIBNCCL_PACKAGE_NAME=libnccl2
HUB_PORT_8001_TCP_PROTO=tcp
NV_LIBNCCL_PACKAGE_VERSION=2.11.4-1
DBUS_SESSION_BUS_ADDRESS=unix:abstract=/tmp/dbus-XZxV6N0ra,guid=679e01852663b2dae92635fa641887b8
JUPYTERHUB_USER=msada@hawk.iit.edu
JUPYTERHUB_ACTIVITY_URL=http://hub:8001/hub/api/users/msada@hawk.iit.edu/activity
DEBIAN_FRONTEND=noninteractive
XILINX_VITIS=/tools/Xilinx/Vitis/2022.2
OLDPWD=/home/jovyan
_/usr/bin/env
jovyan@jupyter-msada-40hawk-2e1it-2eedu:~$ kubectl
bash: kubectl: command not found
jovyan@jupyter-msada-40hawk-2e1it-2eedu:~$
```

- Output of `uname -a`:

```
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$ uname -a
Linux jupyter-msada-40hawk-2eiit-2eedu 5.3.0-release.93.016246f09f09 #2.5.0.55162.gio SMP Sat Mar 26 05:44:09 UTC 2022 x86_64 x86_64 x86_64 GNU/Linux
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$
```

**Kernel version: 5.3.0**

**CPU Arch: x86\_64**

- Output of `lscpu`:

```
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$ lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
Address sizes:          43 bits physical, 48 bits virtual
CPU(s):                96
On-line CPU(s) list:   0-95
Thread(s) per core:    2
Cores(s) per socket:   24
Socket(s):              2
NUMA node(s):          2
Vendor ID:             AuthenticAMD
CPU family:            23
Model:                 49
Model name:            AMD EPYC 7F72 24-Core Processor
Stepping:              0
Frequency boost:        enabled
CPU MHz:               2372.361
CPU max MHz:           3200.0000
CPU min MHz:           2500.0000
BogoMIPS:              6400.30
Virtualization:        AMD-V
L1d cache:             1.5 MiB
L1i cache:             1.5 MiB
L2 cache:              24 MiB
L3 cache:              384 MiB
NUMA node0 CPU(s):     0-23,48-71
NUMA node1 CPU(s):     24-47,72-95
Vulnerability L1tf:     Not affected
Vulnerability Rds:      Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP conditional, RSB filling
Flags:                  fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl
                          nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy
                          y_4m sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 hwp_ustate sme ssbd mba sev ibrs ibpb
                          b_sttbp vmcall fsgsbase bmi1 avx2 smep bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_loc
                          al clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif umip
                          rdpid overflow_recov succor smca
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$
```

**Virtualization: AMD-V**

**AMD Architecture**

- We have superuser access
- `lspci | grep -i virtual` and `lsmod | grep -i virt` returned nothing

```
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$ cat /etc/lsb-release
DISTRIB_ID=Ubuntu
DISTRIB_RELEASE=20.04
DISTRIB_CODENAME=focal
DISTRIB_DESCRIPTION="Ubuntu 20.04.4 LTS"
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$
```

**Ubuntu 20.04 with xcf**

**Consistent with ESnet's requirements**

- **Vitis and Vivado 2022.2**

**Newer than ESnet's requirements.**

Stacey mentioned that Vivado version discrepancies can be overcome.

```
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$ lspci -d 10ee:
ac:00.0 Processing accelerators: Xilinx Corporation Device 505c
ac:00.1 Processing accelerators: Xilinx Corporation Device 505d
ad:00.0 Processing accelerators: Xilinx Corporation Device 505c
ad:00.1 Processing accelerators: Xilinx Corporation Device 505d
ae:00.0 Processing accelerators: Xilinx Corporation Device 505c
ae:00.1 Processing accelerators: Xilinx Corporation Device 505d
af:00.0 Processing accelerators: Xilinx Corporation Device 505c
af:00.1 Processing accelerators: Xilinx Corporation Device 505d
b2:00.0 Processing accelerators: Xilinx Corporation Device 505c
b2:00.1 Processing accelerators: Xilinx Corporation Device 505d
b3:00.0 Processing accelerators: Xilinx Corporation Device 505c
b3:00.1 Processing accelerators: Xilinx Corporation Device 505d
```

FPGAs are connected via PCIe.

```
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$ lsusb
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
Bus 002 Device 002: ID 05e3:0620 Genesys Logic, Inc. USB3.1 Hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 003: ID 05e3:0610 Genesys Logic, Inc. 4-port hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

FPGAs are not connected via JTAG.

```
jovyan@jupyter-msada-40hawk-2eiit-2eedu:~$ sudo lspci -d 10ee: -vv
ac:00.0 Processing accelerators: Xilinx Corporation Device 505c
Subsystem: Xilinx Corporation Device 000e
Physical Slot: 5
Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx+
Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
Latency: 0, Cache Line Size: 64 bytes
NUMA node: 1
Region 0: Memory at 58072000000 (64-bit, prefetchable) [size=32M]
Region 2: Memory at 58074040000 (64-bit, prefetchable) [size=256K]
Capabilities: <access denied>
Kernel driver in use: xcvmgmt
lspci: Unable to load libkmod resources: error -12

ac:00.1 Processing accelerators: Xilinx Corporation Device 505d
Subsystem: Xilinx Corporation Device 000e
Physical Slot: 5
Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx-
Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
Latency: 0, Cache Line Size: 64 bytes
Interrupt: pin A routed to IRQ 1387
NUMA node: 1
Region 0: Memory at 58070000000 (64-bit, prefetchable) [size=32M]
Region 2: Memory at 58074000000 (64-bit, prefetchable) [size=256K]
Region 4: Memory at 58060000000 (64-bit, prefetchable) [size=256M]
Capabilities: <access denied>
Kernel driver in use: xocl
```

Region 0: 32M

Region 1: 256k

Capabilities: <access denied>: I don't know how that affects our progress.

```
jooyan@jupyter-msada-40hawk-2eitt-2eedu:~$ cat /proc/cmdline
BOOT_IMAGE=images/gigaio-image-v250.1013_3/vmlinuz initrd=images/gigaio-image-v250.1013_3/initrd rd.driver.blacklist=nouveau amd_iommu=on hugepagesz=1G hugepages=32 console=tty0 ip=10.141.0.15:10.141.255.10,10.141.255.254:255.255.0.0 BOOTIF=01-d8-5e-d3-69-36-70
```

● **hugepagesz=1G**

**hugepages=32**

**amd\_iommu=on**

**default\_hugepagesz=(Not given) , should be 1G**

**iommu=pt**

- **Grub is not installed**
- **There are no EFI variables.**
- **There is no partition table.**  
**We are running inside a VM.**
- **It seems that there isn't a VitisNetP4 license included.**
- **The makefile for the example P4 aborts due to Vivado being 2022.2.**