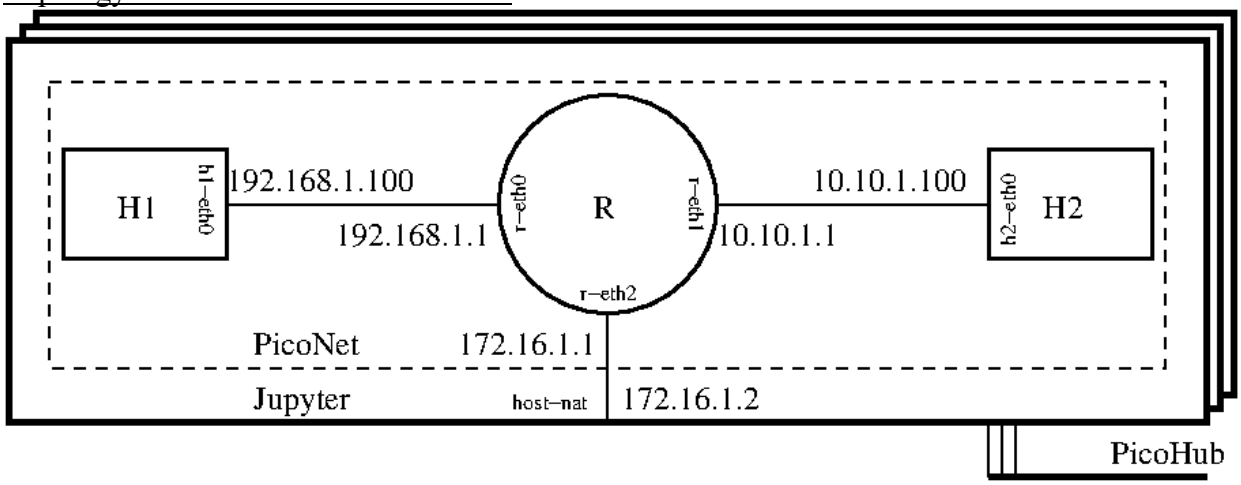
Lab 1: Learn to Use Virtual Lab - PicoNet

Objective: Learn to use PicoNet and other network commands

1.Introduction to PicoNet

Topology of the Virtual Lab – PicoNet[1]:

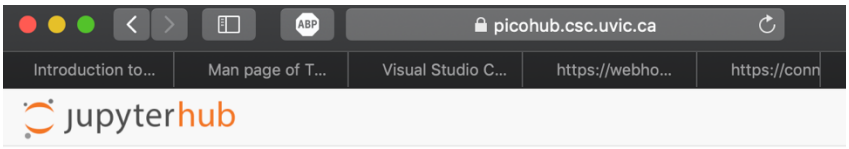


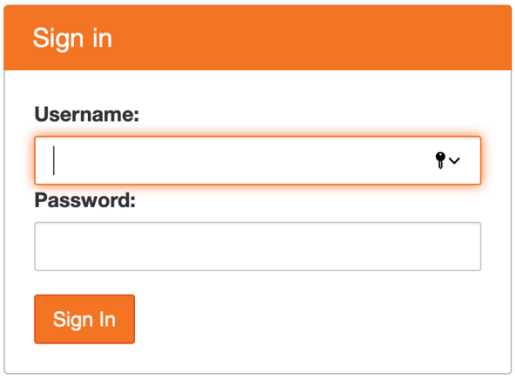
Architecture of the Virtual Lab Setup[2]: the virtual machine is installed on the computer in the Department. It simulates a small network called PicoNet with one router and two hosts. The detailed information on the router and hosts is[3]:

- •Router interfaces: connected to H1 and H2 thru r-eth0 and r-eth1, respectively
  Also connected through r-eth2 to the PicoNet host (host-nat) and then to the Internet
  r (r-eth0 192.168.1.1, r-eth1 10.10.1.1, r-eth2 172.16.1.1)
- •Desktop interfaces:
  h1 (h1-eth0 192.168.1.100): e.g. run client program (connected to R through h1-eth0)
  h2 (h2-eth0 10.10.1.100): e.g. run server program (connected to R through h2-eth0)

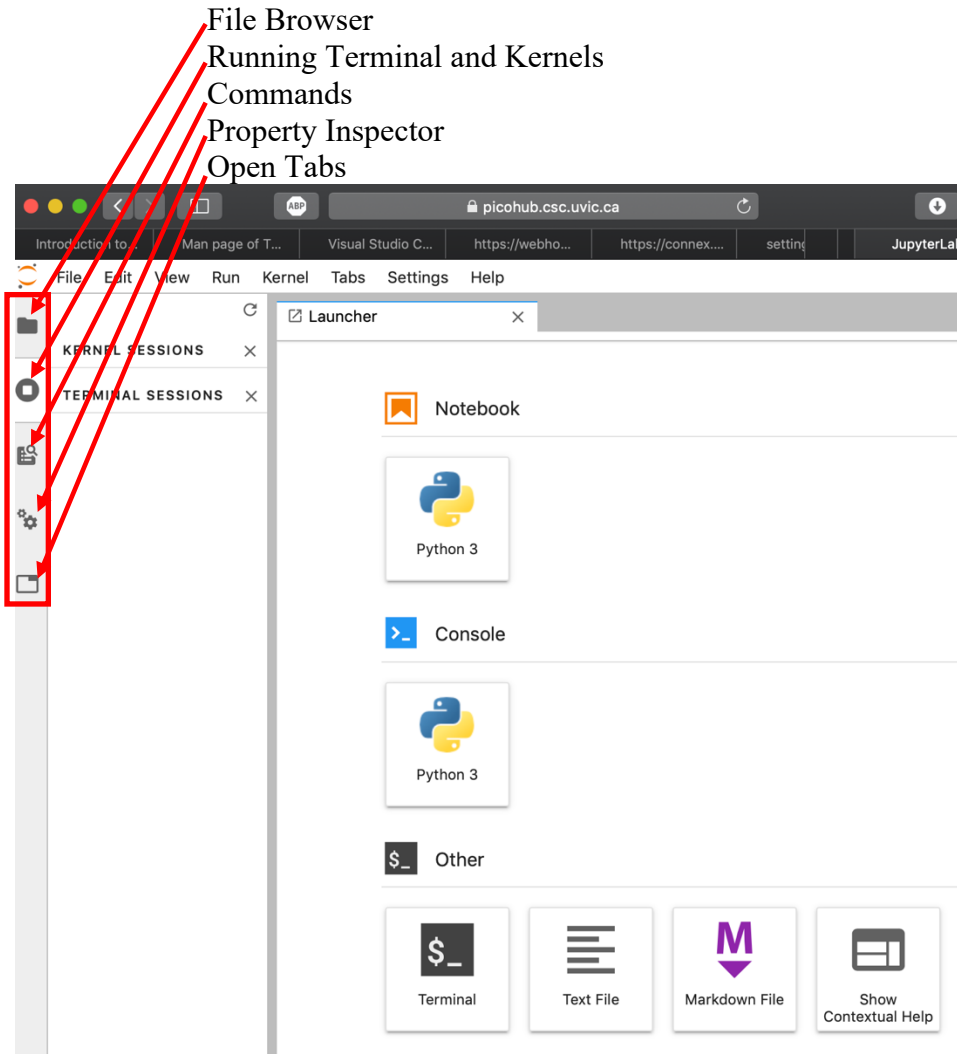
Step by step instruction on access PicoNet:

Step 1: make sure the VPN (**V**irtual **P**rivate **N**etwork) is connected. Go to this website on how to install VPN client and related information:
https://www.uvic.ca/systems/services/internettelephone/remoteaccess/index.php
If you need help, send email to helpdesk@uvic.ca or call 250-721-7687.
Step 2: Launch browser Chrome and enter URL: https://picohub.csc.uvic.ca/
Step 3: Type your netlink ID and password and click on the “Sign In” button.





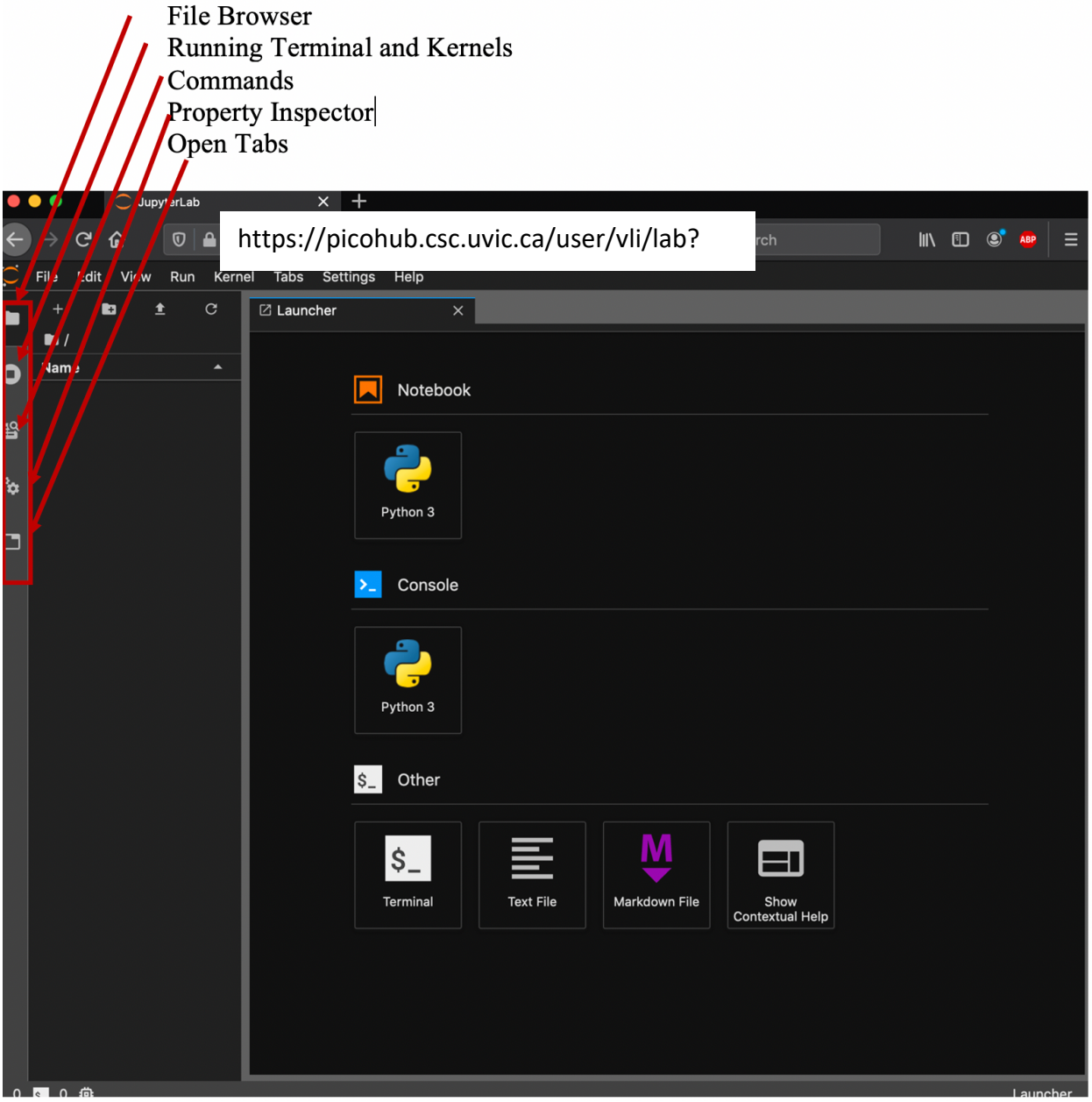
Step 4: The screen looks like this:
Move the mouse and have the cursor hover over the icons on the left hand side, you will see some text describing what the icon does: for example, the text description of the top icon is “File Browser”. Now check the four other icons and you will find the following texts (from top to bottom): (refer to the next page)



You may change the background color by:

Go to menu Settings -> JupyterLab Theme -> JupyterLab Dark/Light

Refer to the next page for result:



PicoNet is a shell that facilitates access to the Linux kernel namespaces we set up for our topology.

Watch the video clips on how to use PicoNet.
Once the four terminals are open, follow the sequence of the actions suggested below:

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on all four terminals, type: (search the man page on command ip)
  ip a
on terminal 3, router, type this command:
  tcpdump -n -l -i r-eth0
on terminal 2, h2, type this command:
  tcpdump -i h2-eth0 -Z root -w /tmp/ping.cap
on terminal 1, h1, type this command:
  ping -c 3 h2
```

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on terminal 2 (h2), press two keyboard keys (control c -- ^c) to stop tcpdump
on terminal 3 (r), press two keyboard keys (control c -- ^c) to stop tcpdump
the captured file ping.cap is at /tmp/, copy or move it to your home
directory:
on terminal 2 (h2), type:
  mv /tmp/ping.cap .
then read the ping.cap file:
on terminal 2 (h2), type:
  tcpdump -n -l -r ping.cap
or type:
  tshark -r ping.cap
or type:
  termshark -r ping.cap
  use ^c to stop the program
```

The picohub.pdf file is used for the whole semester. The first 27 pages are related to lab 1.

Extra resources:

1.Man page of TCPDUMP: https://www.tcpdump.org/manpages/tcpdump.1.html
2.Introduction of TCPDUMP:
https://medium.com/swlh/introduction-to-tcpdump-635653f56177
3.Man page of PING: https://linux.die.net/man/8/ping
4.How to Use the ip Command on Linux: https://www.howtogeek.com/657911/how-to-use-the-ip-command-on-linux/
5. Linux ip Command with Examples: https://linuxize.com/post/linux-ip-command/

This note is created by Dr. Jianping Pan, Zhiming Huang, Victoria Li, Rui Liu, Wenjun Yang

References:

1. Provided by Dr. Jianping Pan
2. Adapted from the system administrator - Mr. Tomas Bednar's notes
3. The picohub.pdf file is downloaded from Dr. Jianping Pan's notes at
http://tinyurl.com/picohub