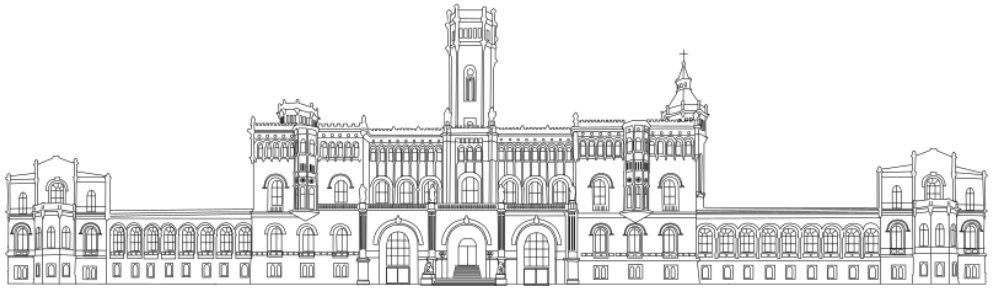
Institut für Kommunikations–Technik

Future Internet

Mininet Tutorial 1



Institut für Kommunikationstechnik
Leibniz Universität Hannover

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Leibniz Universität Hannover

What is mininet?

- Mininet is a network emulator that let you create networks of many switches, routers, and hosts, and emulate different link properties between them.
- The different devices (routers and hosts) are run in separate containers.
- Switches are emulated by creating virtual interfaces and linking the containers to them.
- Link properties are emulated using tc (linux traffic control) and netem.
- Many resources are available on the Mininet web page: http://mininet.org/

Get and install Mininet (2 options)

Use the Mininet VM

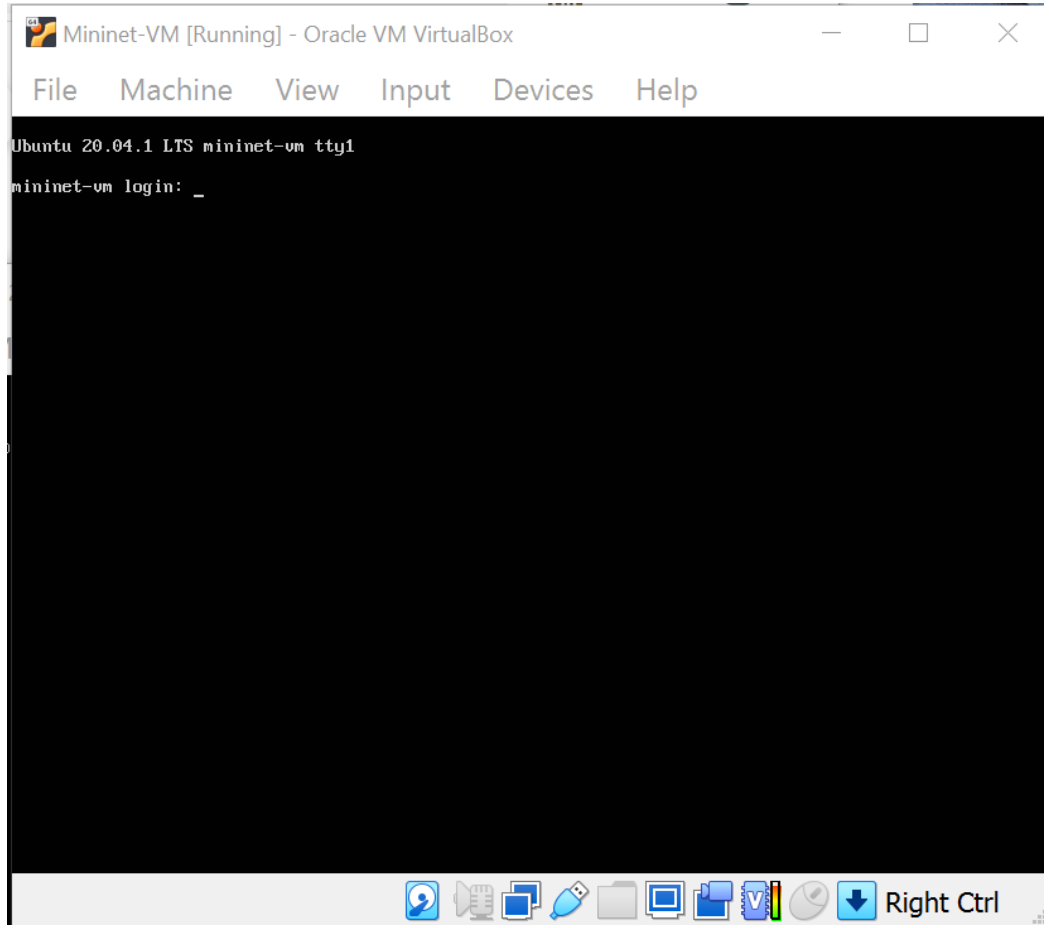
- Download VM image here: https://github.com/mininet/mininet/releases/
- We will use the latest image: mininet-2.3.0-210211-ubuntu-20.04.1-legacy-server-amd64-ovf.zip
- You can run the VM image in VirtualBox, VMware, KVM, Qemu, or Hyper-V.
- These instructions will be based on using VirtualBox, but others are similar.

Install Mininet directly (linux only)

- You can install from source, or from packages. Instructions for both are here: http://mininet.org/download/

Connecting to the VM (2 options)

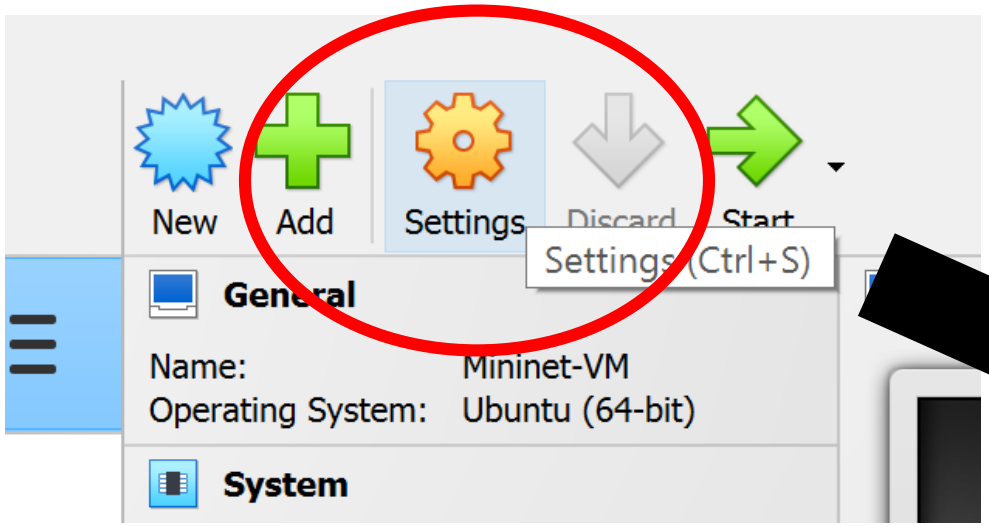
Use the console window

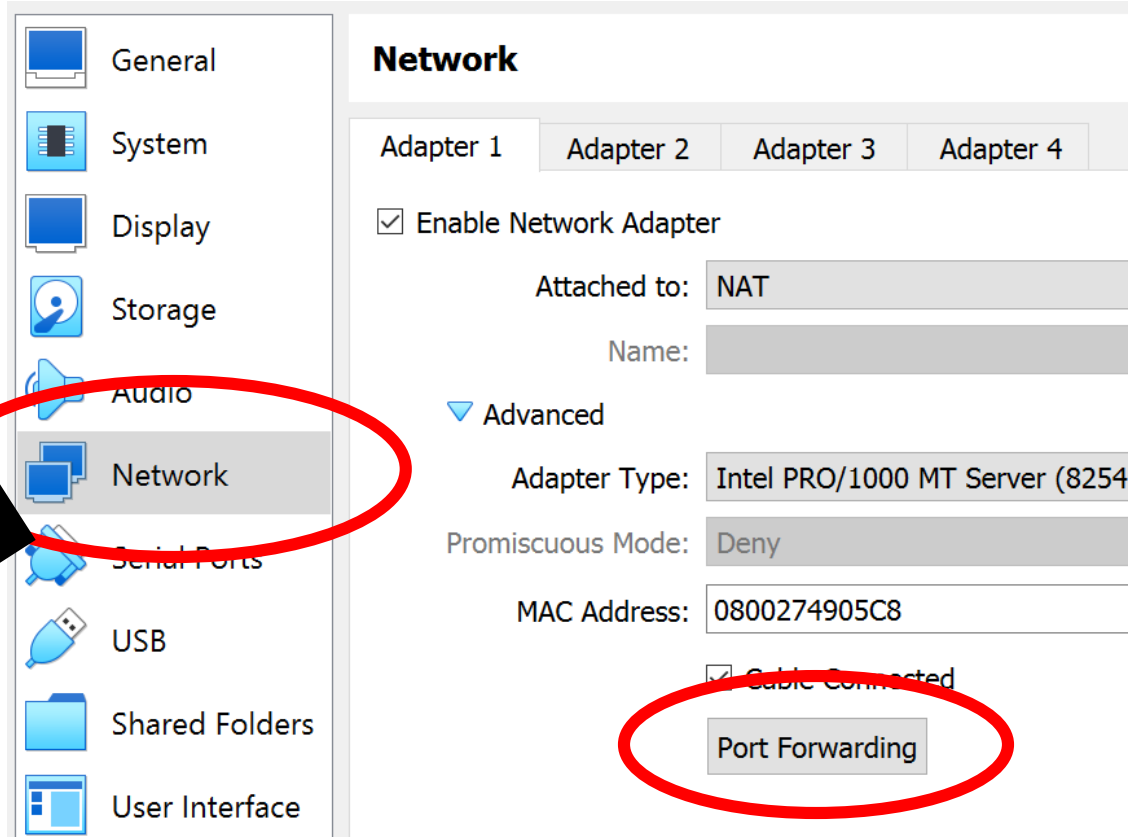


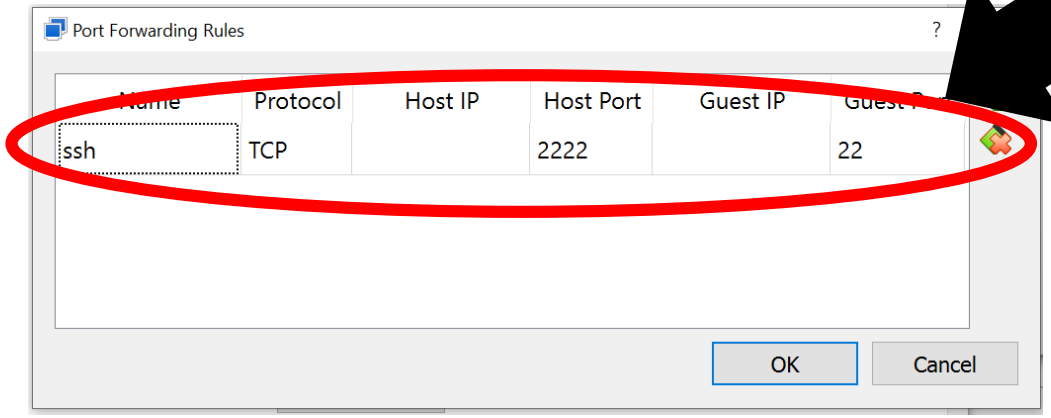
Connect through ssh

- Can have multiple windows open.
- Easier to cut and paste text from an ssh terminal.
- Can move data to/from the VM using scp or sftp.
- If you are familiar with VM network setup already, you can do this however you like. We will just show one method.

Connecting to the VM through ssh (Virtual Box, 3 clicks)





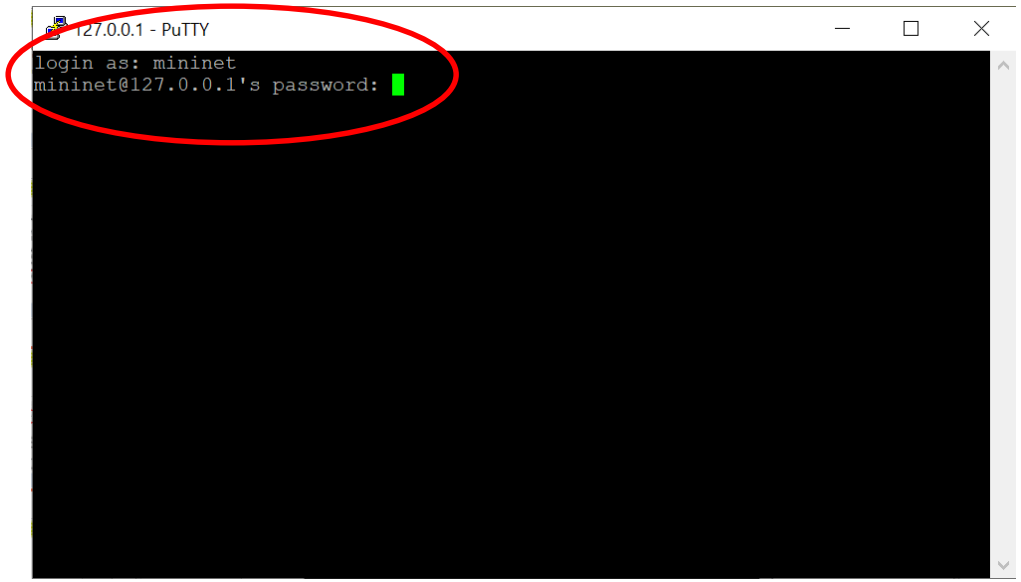


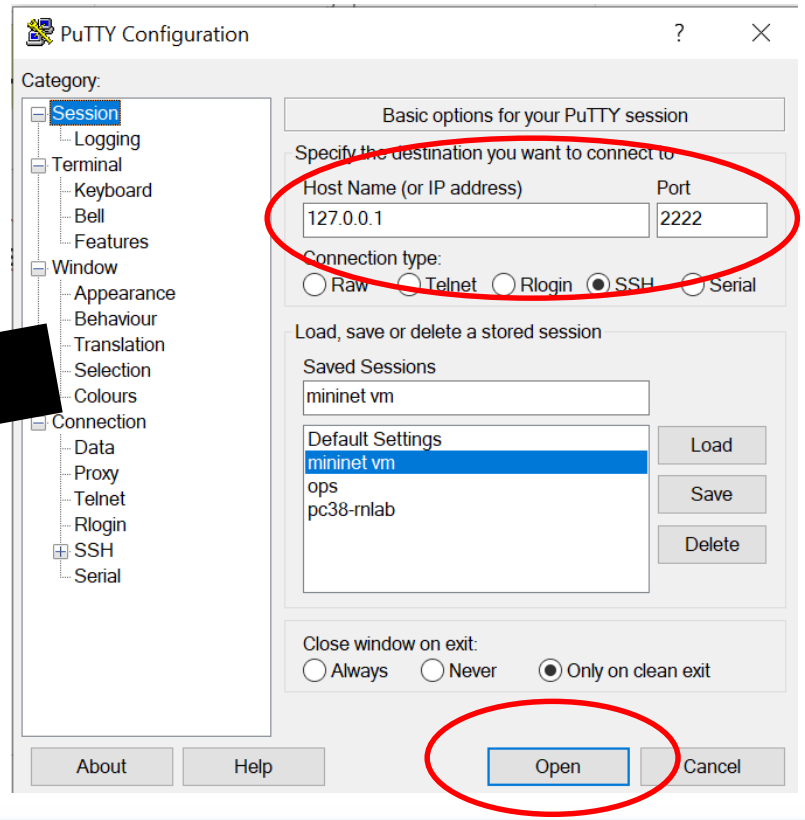
Connecting to the VM through ssh (Virtual Box, 3 clicks)

- On linux:

```
ssh -p 2222 mininet@127.0.0.1
```

- On windows (with putty ssh client):





Get and install Mininet

- These instructions will assume you are using the Mininet VM in VirtualBox. Other methods should be about the same.

1. Install additional software
2. Run Mininet
3. Basic commands
4. Moving files between VM and host

1. Install additional software

- Log into the Mininet VM (user: mininet, password: mininet)
- If you install mininet directly on your computer, you need to install these additional tools on your computer as well.

```
sudo apt-get update
sudo apt-get install ntpdate
sudo ntpdate de.pool.ntp.org
sudo apt-get update
sudo apt-get install iperf3 iftop tcptrack htop d-itg
```

2. Run Mininet

- The Mininet homepage has a good tutorial. http://mininet.org/walkthrough/
- But here are some basic commands.
- To start mininet with the default two-host topology, run: **`mininet@mininet-vm:~$ sudo mn`**
- You will then be in the mininet shell:

```
mininet@mininet-vm:~$ sudo mn
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1)
*** Configuring hosts
h1 h2
*** Starting controller
c0
*** Starting 1 switches
s1 ...
*** Starting CLI:
mininet>
```

3. Basic commands

command	what is does	typical output

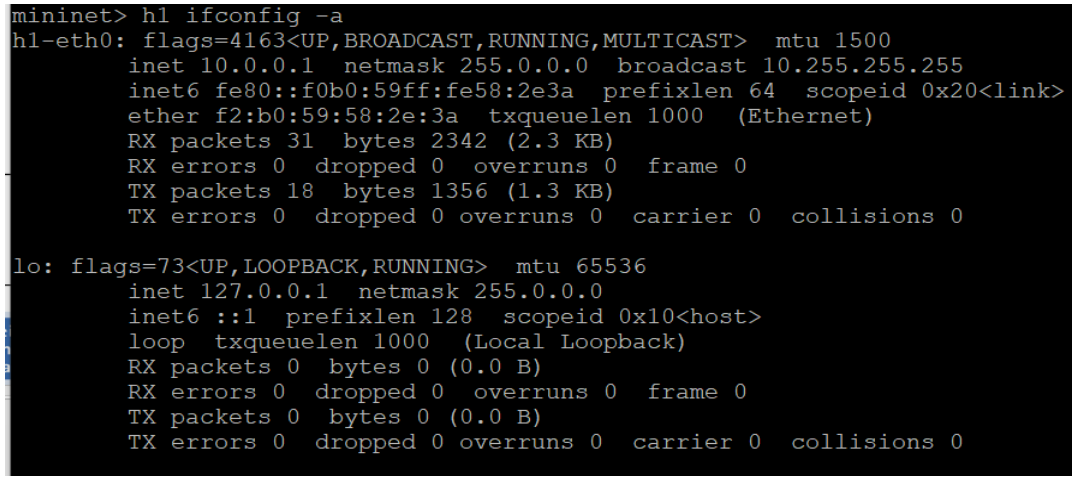
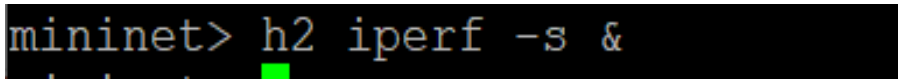
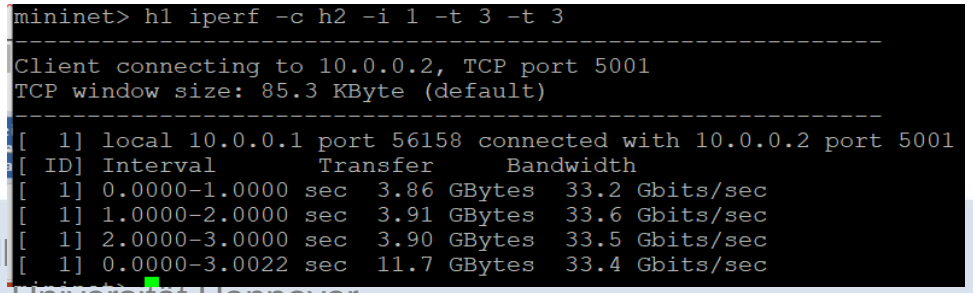
`net`	display all the hosts, switches, controllers, and links	`mininet> net`
		`h1 h1-eth0:s1-eth1`
		`h2 h2-eth0:s1-eth2`
		`s1 lo:  s1-eth1:h1-eth0 s1-eth2:h2-eth0`
		`c0`
		`mininet>`

`nodes`	list all the nodes in the topology	`mininet> nodes`
		`available nodes are:`
		`c0 h1 h2 s1`
		`mininet>`

`dump`	more node info	`mininet> dump`
		`<Host h1: h1-eth0:10.0.0.1 pid=3169>`
		`<Host h2: h2-eth0:10.0.0.2 pid=3171>`
		`<OVSSwitch s1: lo:127.0.0.1,s1-eth1:None,s1-eth2:None pid=3176>`
		`<Controller c0: 127.0.0.1:6653 pid=3162>`
		`mininet>`

`pingall`	all hosts ping each other	`mininet> pingall`
		`*** Ping: testing ping reachability`
		`h1 -> h2`
		`h2 -> h1`
		`*** Results: 0% dropped (2/2 received)`

3. Basic commands

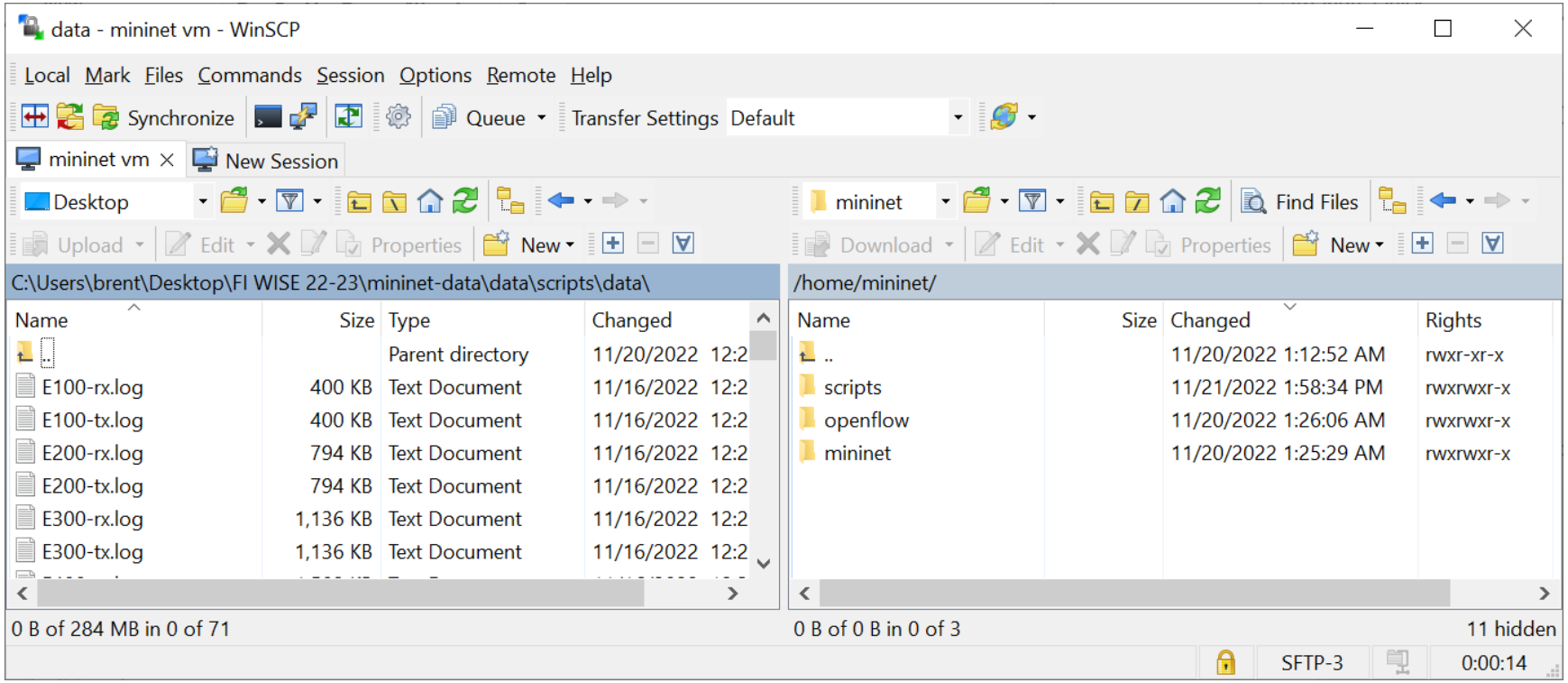
command	what is does	typical output
`h1 <command>` `h2 <command>`	run a command on the given host	
`h1 ifconfig -a`	run 'ifconfig -a' on host h1	
`h2 iperf -s &`	run 'iperf -s' on host h2 and put it in the background	
`h1 iperf -c h2 -i 1 -t 3`	run iperf client on h1. Connect to iperf server on h2. Run for 3 seconds, with updates every 1 second.	

4. Moving files between VM and host

- There are many ways to do this. If you already know how, that is great.
- If not, I suggest either of these two methods:
  - scp or sftp to the VM
  - Shared folders

4. Moving files between VM and host

- scp or sftp
- On Windows I use WinSCP



4. Moving files between VM and host

- Shared folders