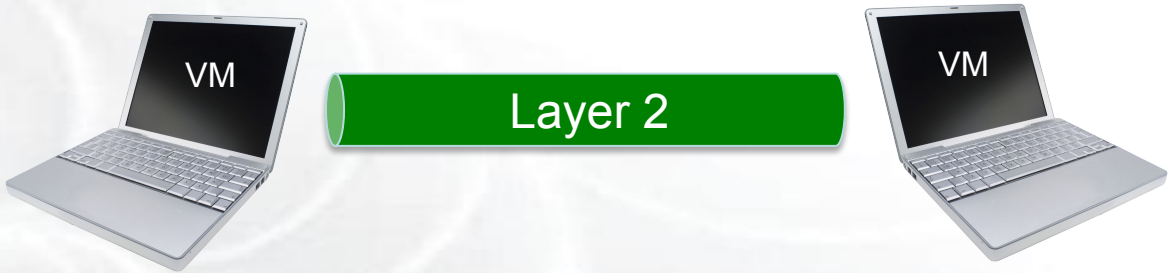
Lab Zero:
A First Experiment using GENI

Instruction Set and Worksheet Available:
http://groups.geni.net/geni/wiki/GENIExperimenter/Tutorials/TrainTheTA-Fall2017

Do a Simple Experiment in GENI

Reserve two VMs connected at Layer 2



Experiment Workflow

- Part I: Design/Setup
- Part II: Execute
- Part III: Finish

Experiment Workflow

- **Part I: Design/Setup**
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Part I: Establish Management Environment

1 Pre-work: Design your experiment

2.1 Pre-work: Create a GENI account

2.2 Pre-work: Project lead (aka professor) adds you to project

Project Name: Classroom-Fall2017

2.3 Generate and Download SSH Keypair

The GENI Portal is…

A web-based tool for experimenters to manage **experimenters**, **projects**, and **slices**.

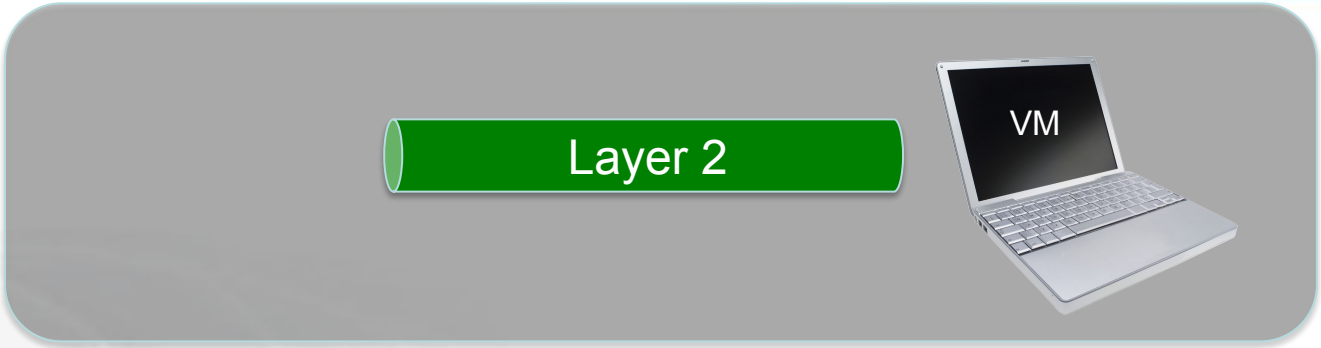
Includes simple tools to reserve **resources**.

https://portal.geni.net/

On your local machine…

```
> mv ~/Downloads/id_geni_ssh_rsa ~/.ssh/.
> chmod 600 ~/.ssh/id_geni_ssh_rsa
> ssh-add ~/.ssh/id_geni_ssh_rsa
```

Part I continued: Obtain Resources



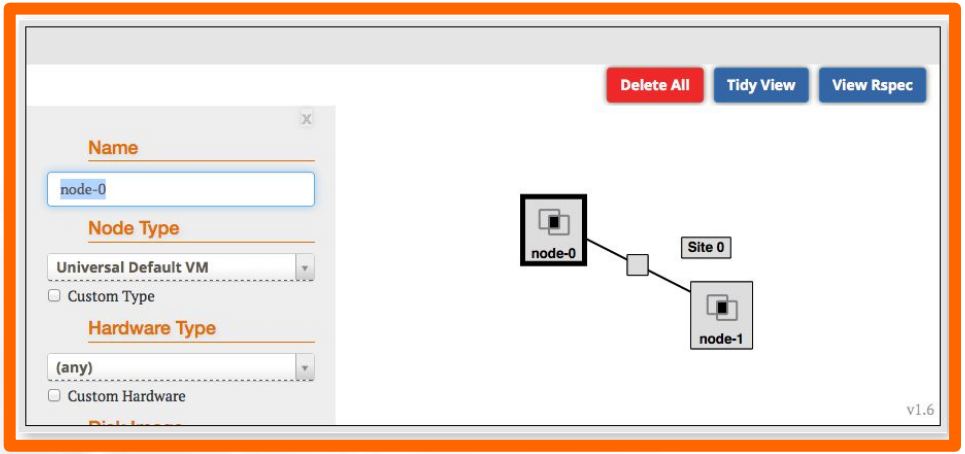
3.1 Create a slice

3.2 (optional) Renew your slice

3.3 Reserve two VMs at one aggregate

3.4 Check Whether VMs are Ready to be Used

Jacks is …



Graphical user interfaces (GUIs) for:

– **designing topologies** in GENI

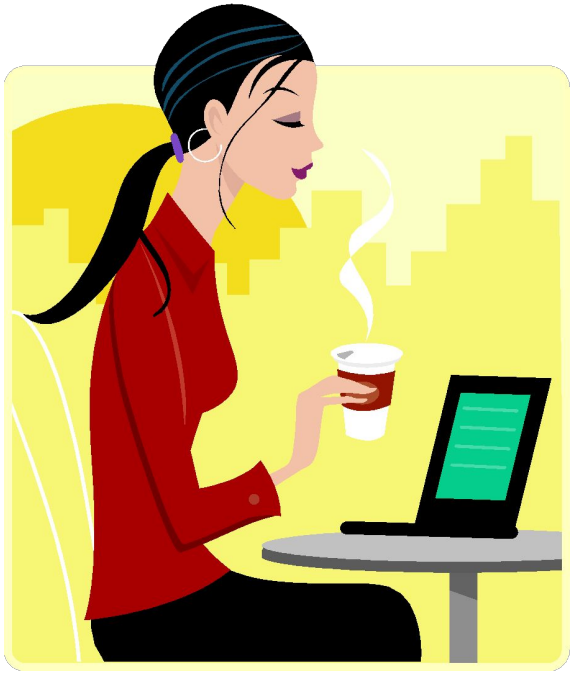
– **reserving resources** in GENI

An **experimenter**

is a researcher who uses GENI resources

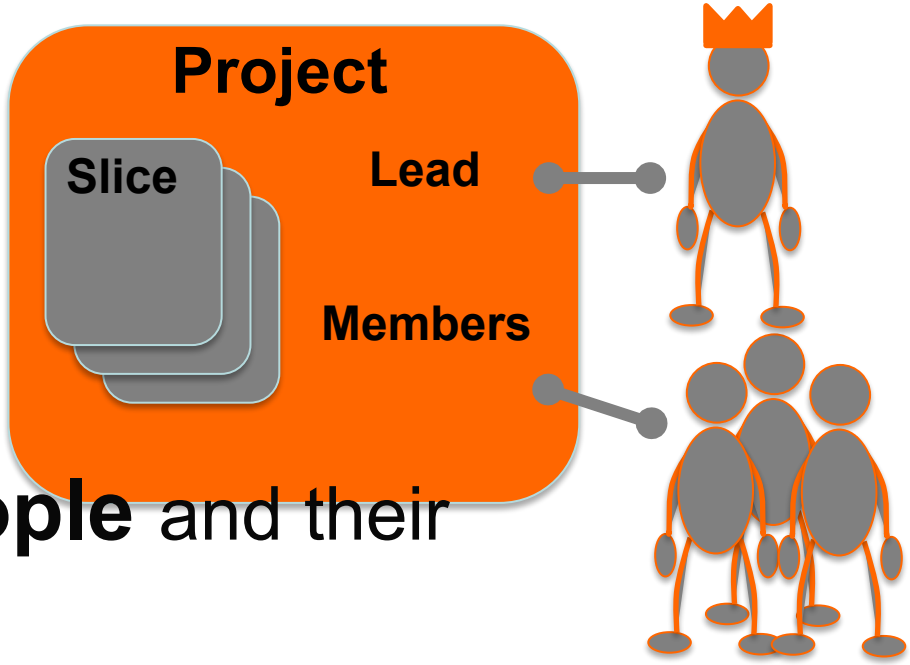
Different types of experimenters have different roles and permissions:

- Advisor vs Grad Student
- Teacher vs TA vs Student



Experimenter

Projects organize research in GENI



Projects contain both **people** and their **experiments**

A project is led by a single responsible individual: the **project lead**

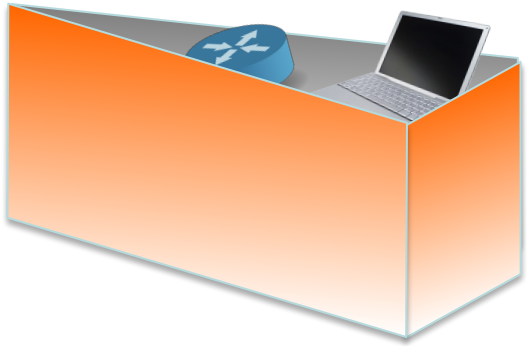
A **slice** is a *container* of resources used in an *experiment*.

A slice can contain resources from one or more aggregates

A slice is in a single project

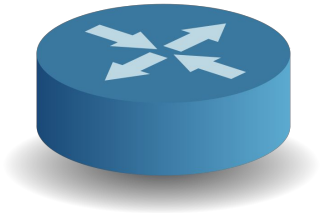
A slice has an ***expiration***

Slice names are ***public***, ***reusable*** and ***unique*** *(within a project)*



A **resource**

is a piece of infrastructure



A resource can be real or virtual.

Resource specifications (aka. **RSpecs**) are used to describe and request resources.

Examples:

- Compute: computer vs virtual machine (VM)
- Wireline Network: VLAN or OpenFlow
- Wireless: WiMAX

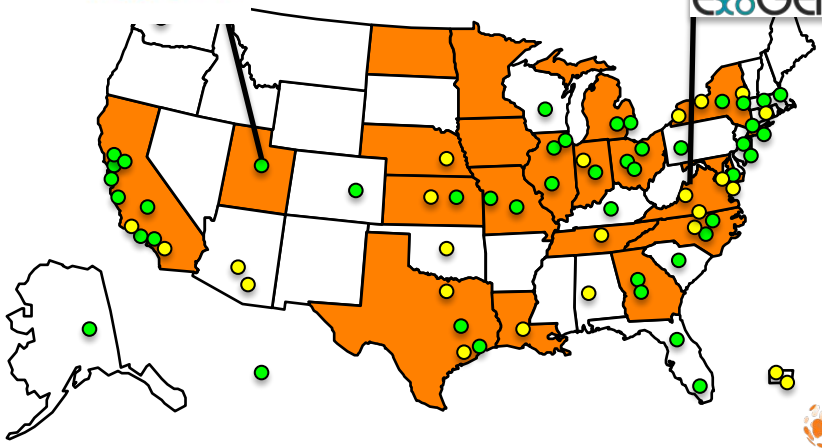
An **aggregate** manages a set of reservable **resources**

Aggregates include:

- GENI racks
- OpenFlow
- WiMAX

InstaGENI Rack

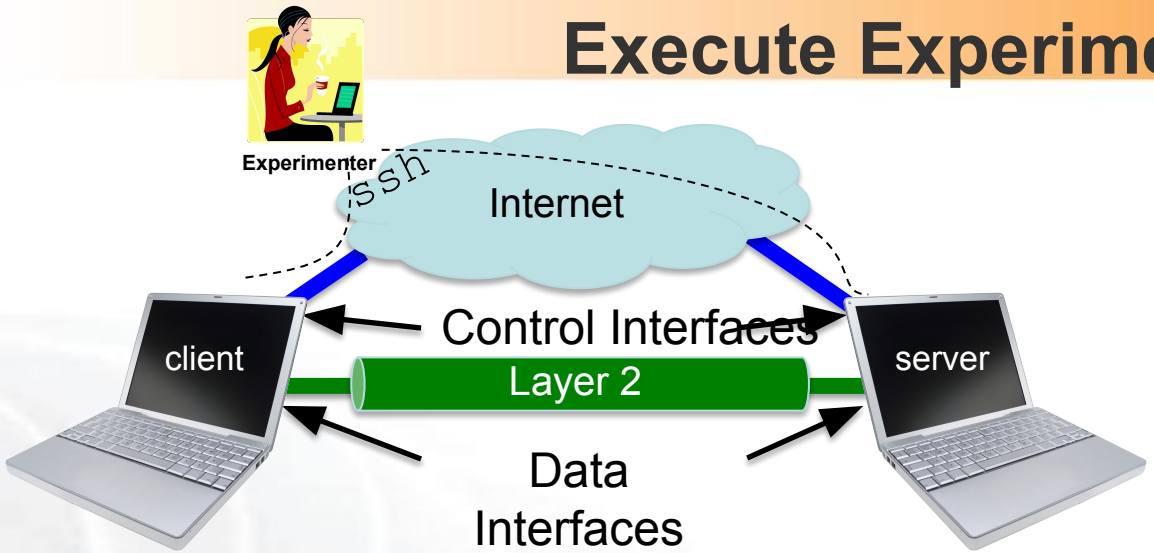
ExoGENI Rack



Experiment Workflow

- Part I: Design/Setup
- **Part II: Execute**
- Part III: Finish

Part II: Execute Experiment



4.1 Login to both nodes

5.1 Test Connectivity

5.2 Explore the Data and Control Planes

6.1 Logout of nodes

Mac/Linux: Enter into terminal

```
ssh <username>@<hostname> -p <port number>
ssh aldenc@pc3.instageni.research.umich.edu -p 25210
```

FireSSH: Enter into firefox

```
ssh://<username>@<hostname>:<port number>
ssh://aldenc@pc3.instageni.research.umich.edu:25210
```

PuTTY: Enter into PuTTY client

```
Host: <username>@<hostname>
Port: <port number>
Connection Type: SSH
Connection -> SSH -> Auth: Key Location
```

```
$ sudo ifconfig
```


```
$ sudo ifconfig
```

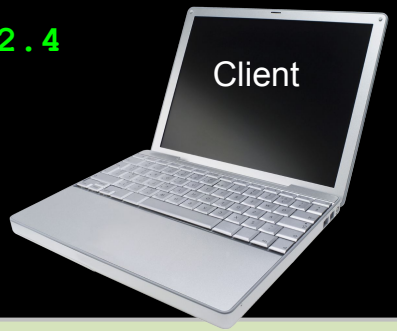
```
# ping <server data IP addr> -c 5
$ ping 10.10.1.2 -c 5

# ping <server control IP addr> -c 5
$ ping 172.17.1.9 -c 5
```

```
$ sudo apt-get install iperf
$ hash
```

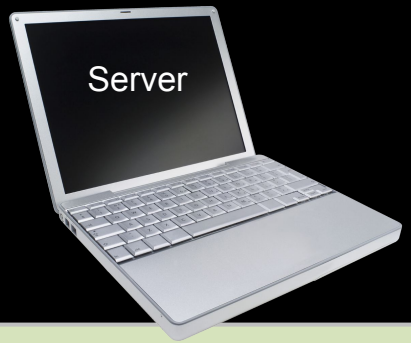
```
# server data i/f
$ iperf -c 10.10.1.2

# server ctrl i/f
$ iperf -c 172.17.2.4
…
```

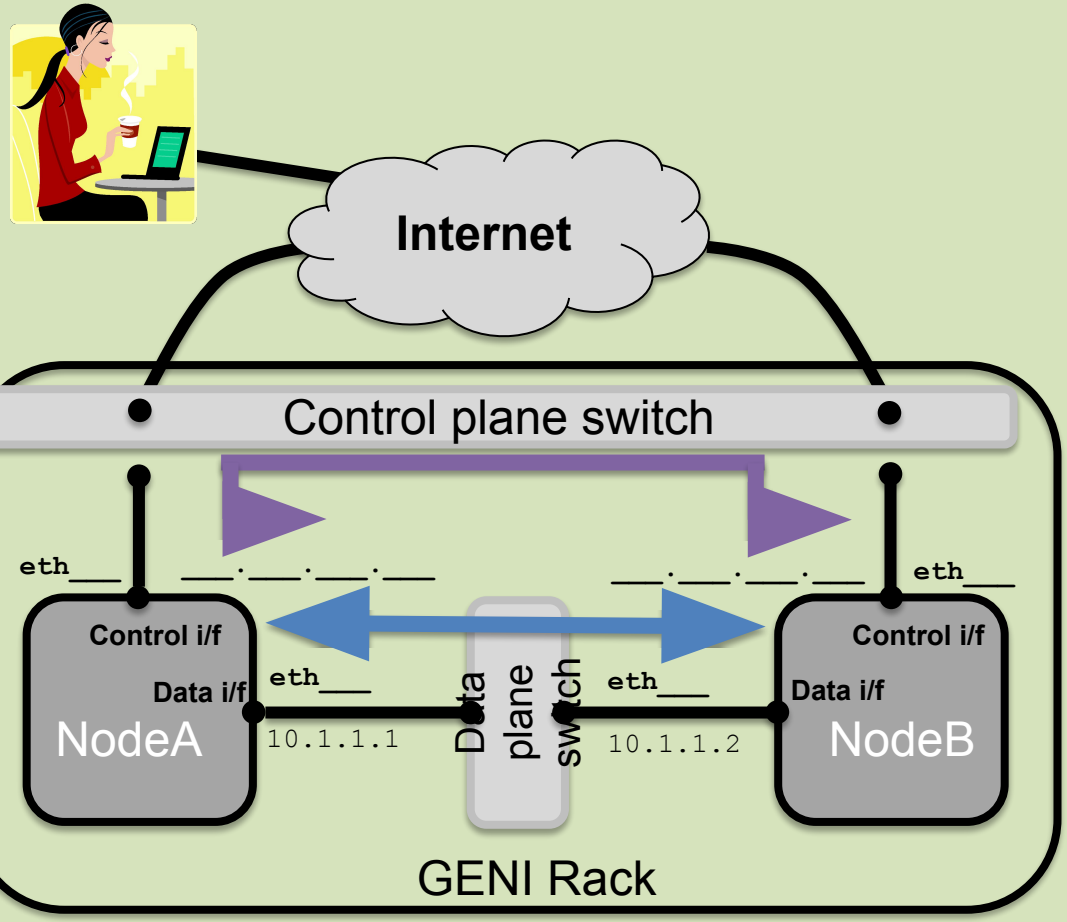



```
$ sudo apt-get install iperf
$ hash

# start an iperf server
$ iperf -s
```



*What is the bandwidth of the **data** link? Why?*
*What is the bandwidth of the **control** link? Why?*

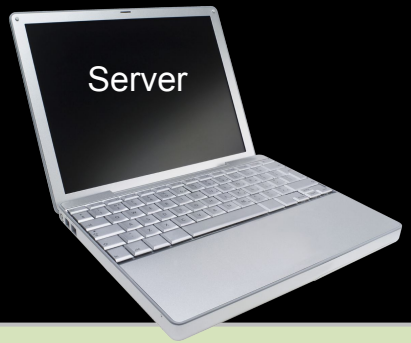


```
# ping <server data IP addr>
$ ping 10.10.1.2
```

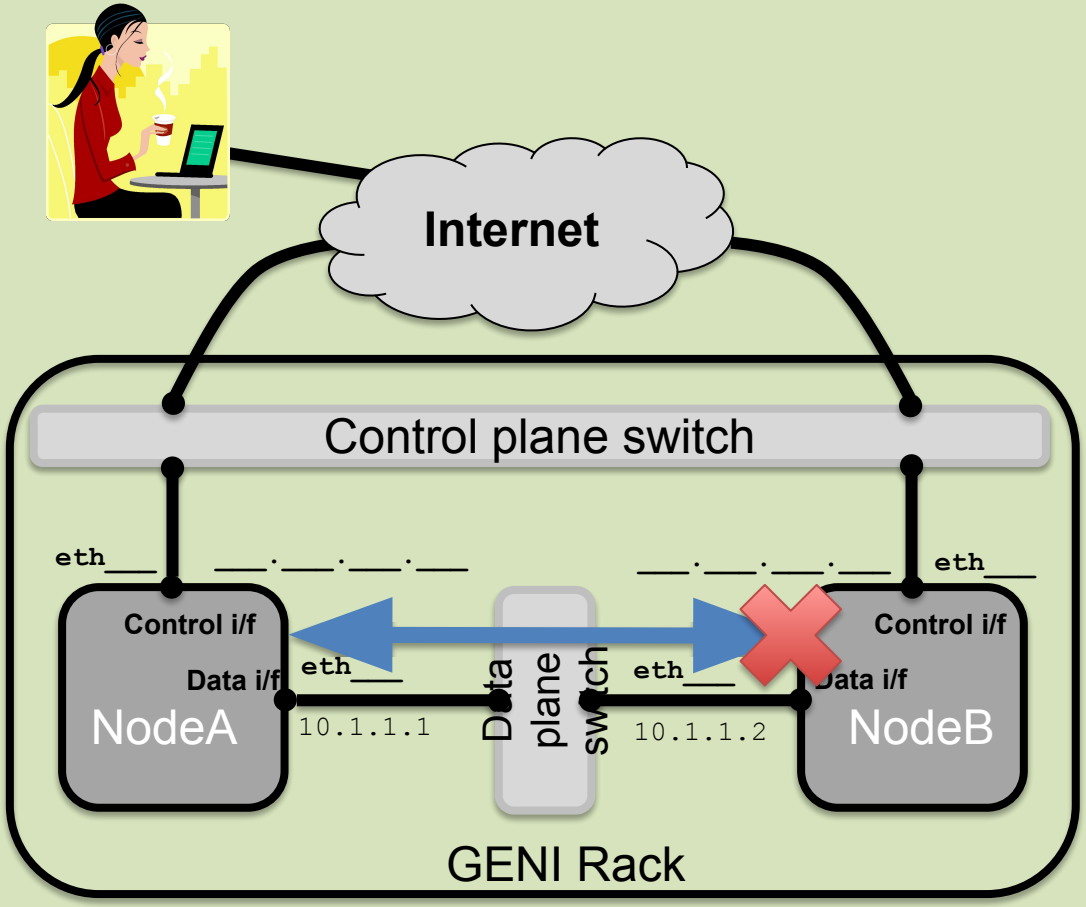

```
$ ^C

# If on ExoGENI
$ sudo service neuca stop
```

```
# bring down data plane interface
# sudo ifconfig <server data
# interface name> down
$ sudo ifconfig eth1 down
```

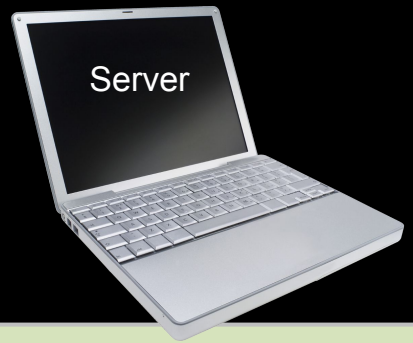


*When you bring down the **data** interface, the destination should become unreachable. Why?*

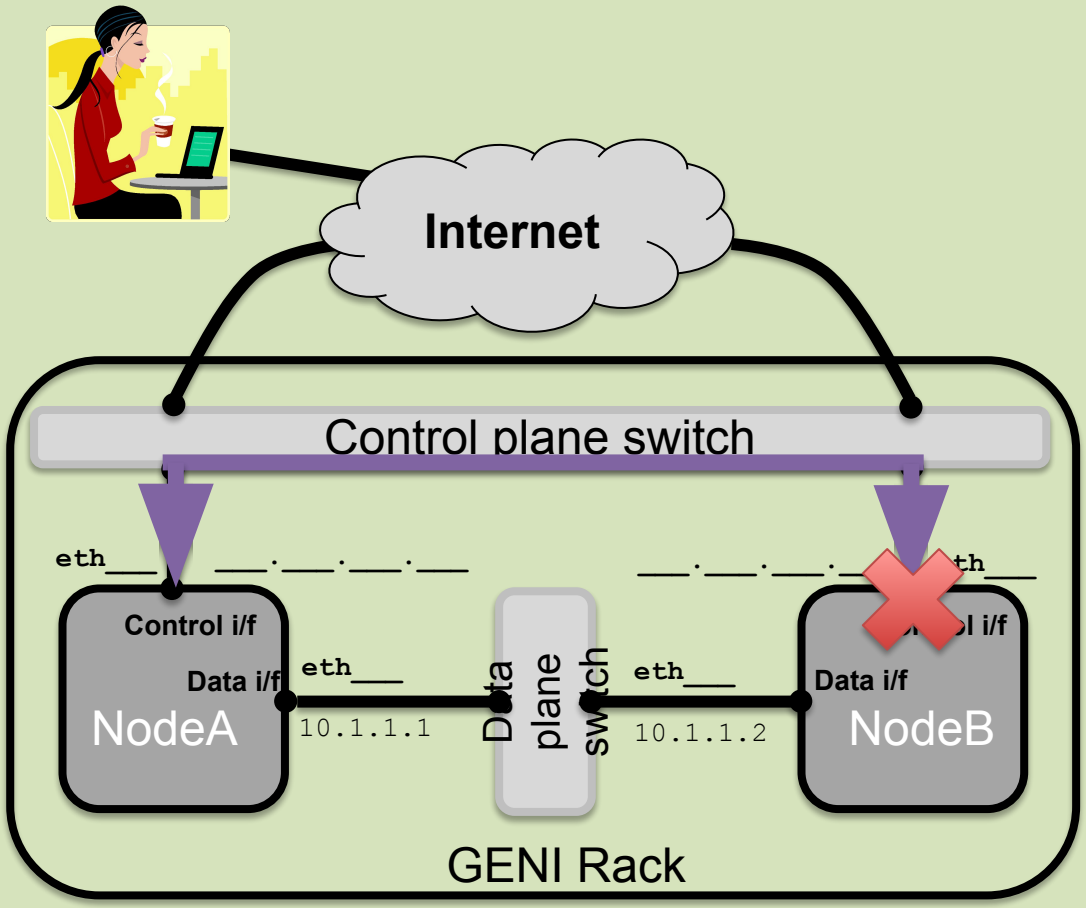


```
# ping <server control IP addr>
$ ping 172.17.1.9
```

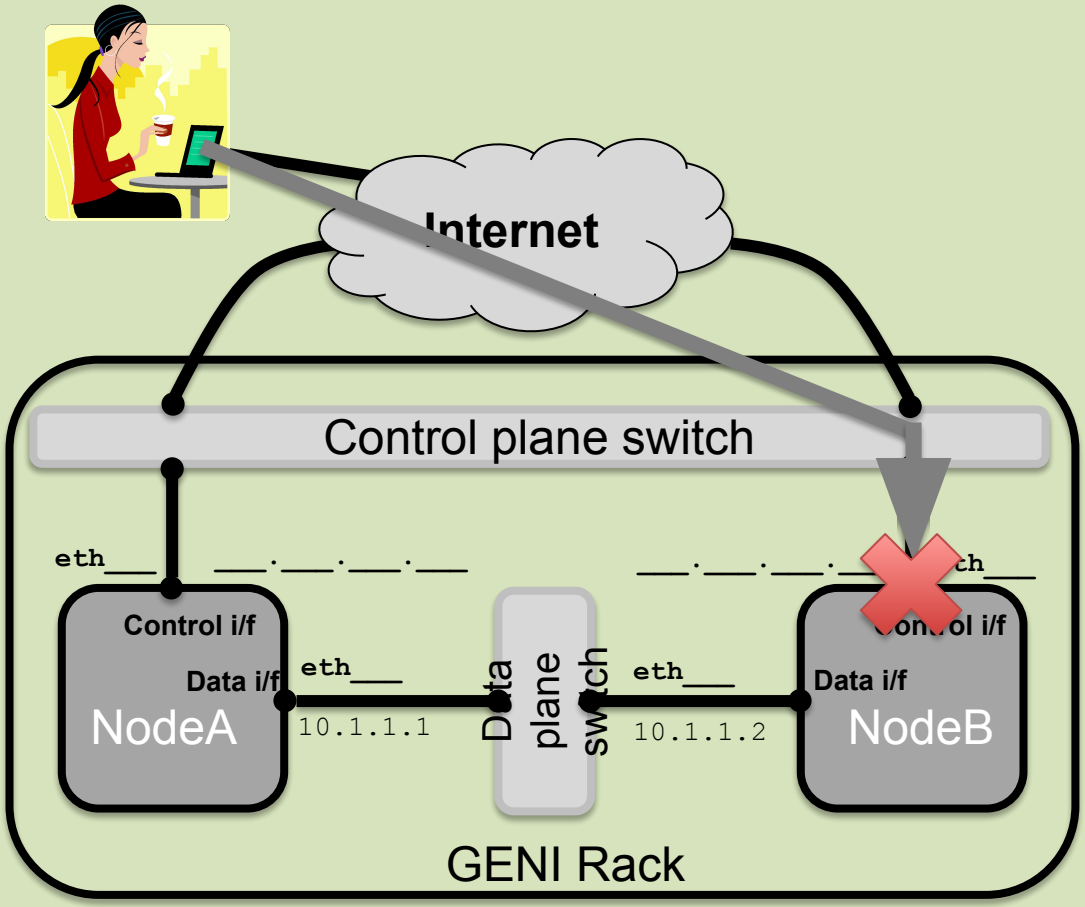

```
# bring down control plane interface
# sudo ifconfig <server control
# interface name> down
$ sudo ifconfig eth0 down
```



*After you bring down the **control** interface, the destination becomes unreachable. Why?*



5.3 *After you bring down the **control** interface, your ssh session should immediately hang. Why?*



Experiment Workflow

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Congratulations!

You have…

- Run your first GENI Experiment!
- Exercised your knowledge of GENI terminology
- Used the GENI Portal and Jacks