GENI Lab 0

Due: 3:30pm, August 28, 2019

1. GENI Portal

GENI portal is an interface through which you request, reserve, manage, and use GENI network resources such as routers, gateways, servers, links, etc.

- Go to https://portal.geni.net/, click "Use GENI".
- On the next page, type **NCSA** in the input box or simply click the NCSA icon if it shows .

> Note: You have to do this because VSU is not one of those schools who have joined the *InCommon Federation* which allows you to login to GENI using school accounts.

- Login to the GENI Portal.

> Note: If you are redirected to a GENI agreement page, just check the boxes that indicate you agree to all policies and to let the portal work on your behalf, then submit the page.

- On the GENI Portal homepage, click the *Home* --> *Projects* tab, notice that you should see that you have already been added to the project **CS4121**. Click it and enter the project.

2. Create SSH Keys

You need command-line based SSH terminals (see details in section 4 later) to issue commands when working on this GENI lab and all the GENI labs and assignments for the rest of the semester,

In order to establish secure connections between such SSH terminals and the GENI resources reserved for you, you need to generate **a pair of SSH keys**: a public key which is saved on the GENI Portal and a private key which needs to be downloaded to the terminal.

- Click your name at the top-right corner of the GENI Portal homepage, then SSH Keys.
- Click "generate and download an SSH keypair".

- On the "Generate an SSH private key" page, type a Passphrase, confirm it, and then click "Generate SSH private key". We will come back to this page later in Section 4.

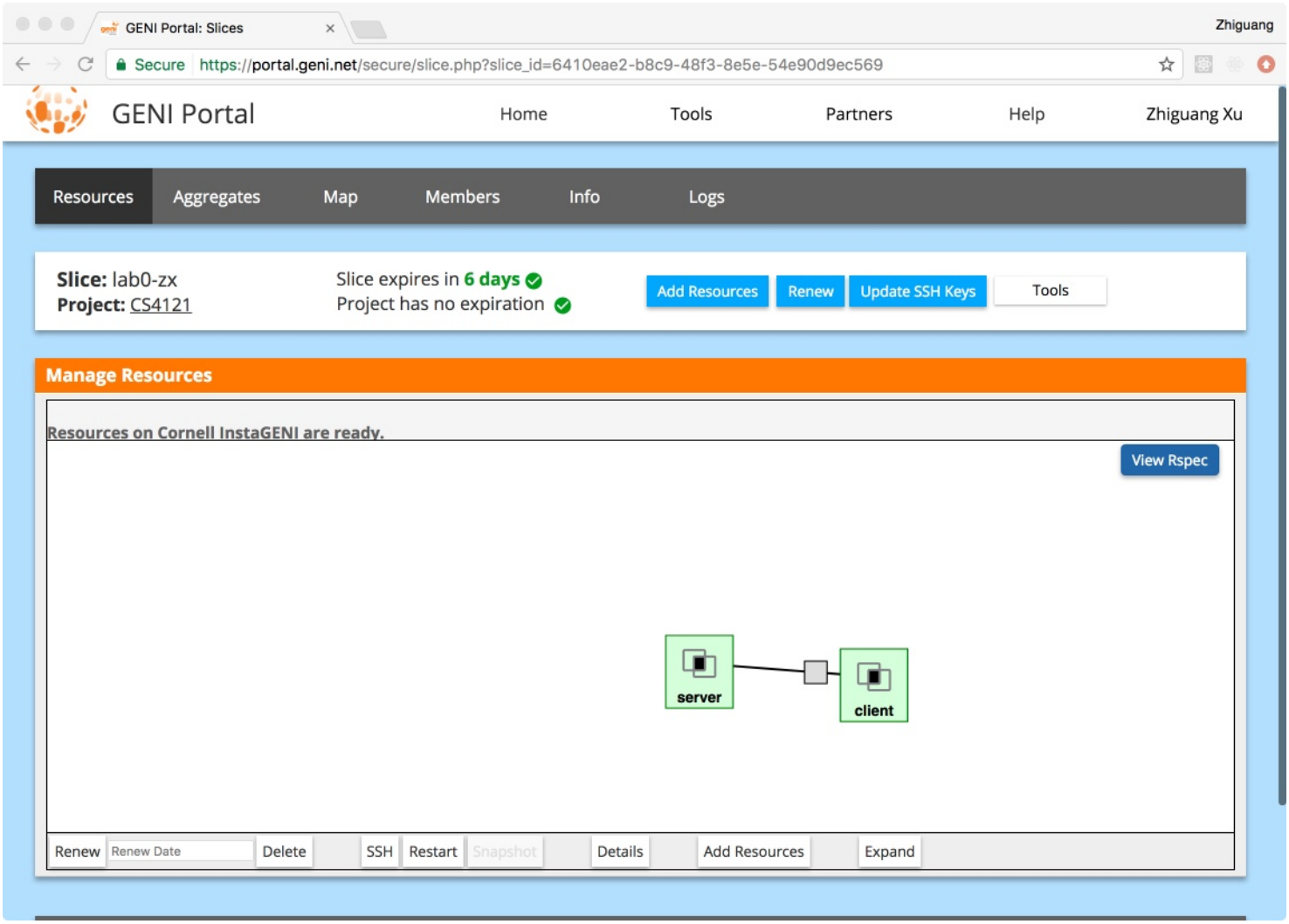
> Note: Make sure you understand that the "Passphrase" is **not** the "Private Key" itself. The passphrase is a phrase that you choose to protect the automatically generated private key, which is a long sequence of binary digits that are not meant to be memorized by humans.

3. Create a GENI Slice and Reserve Resources

- Now, go to the homepage of the project **CS4121** if you are away from it.
- Click "Create Slice", name it "**lab0-yourInitial**" (e.g. for me, it is lab0-zx), and click "Create slice".
- Follow the steps 3.3. and 3.4 in **lab0-supplement.pdf** very carefully to reserve some resources at one of the sites whose name contains "**InstaGENI**".

Note: **It might take around 10-15 minutes for both of the nodes that you reserved above to turn green**. If this does not happen after some extensive time, you need to delete all the resources from your slice and try again. Make sure your slice is truly empty before trying again though. You may choose to reuse the same site or try a different one.

The following screenshot shows how your GENI portal should look like once the reservation step is completed. As you can see, I happened to choose the Cornell site.



4. SSH Terminal

As mentioned in Section 2 above, you need an SSH terminal and you have the following two choices.

4.1. MacOS or Linux Shell

Since both MacOS and Linux machines come with a fully functional terminal, it is very easy to establish a secure connection between your local computer and the GENI Portal.

- Click your name at the top-right corner of the GENI Portal homepage, then SSH Keys.

  > Note: This step needs to be done once and only once unless you decide to use a different computer.

  - Click **Download Private Key**.
  - Follow the instructions under "On Linux and Mac, open a terminal" to login to the "client" node. Basically,

```
cd ~/.ssh   <= if the ~/.ssh folder does not exist, do "mkdir ~/.ssh" then "cd ~/.ssh"
mv ~/Downloads/id_geni_ssh_rsa ~/.ssh/
chmod 0600 ~/.ssh/id_geni_ssh_rsa
```

- Click the "client" node on the GENI slice page for "CS4121:lab0-yourInitial", take notes of the "SSH To" line where url and port number are shown, e.g. `zxu@pc2.geni.it.cornell.edu:26090`
- Do the same for the "Server" node.
- Now, remotely login to the client node:

```
ssh -i ~/.ssh/id_geni_ssh_rsa [username]@[hostname] -p [port]

(E.g. ssh -i ~/.ssh/id_geni_ssh_rsa zxu@pc2.geni.it.cornell.edu -p 26090)
```

  - Say "yes" to the prompt "Are you sure you want to continue connecting".
  - Enter your Passphrase if prompted.

> Note: if you think it is tedious to have to include the `-i ~/.ssh/id_geni_ssh_rsa` option every time you issue the `ssh` command above, do the following. Your private key will be added to a key chain.
>
> ```
> eval "$(ssh-agent -s)"
> ssh-add -k ~/.ssh/id_geni_ssh_rsa
> ```
>
> (If the -k option is not recognized, use -K instead.)
>
> Then simply do the following thereafter.
>
> ```
> ssh [username]@[hostname] -p [port]
> ```

- Run the command above to login to the "server" node.

4.2. Windows PuTTY

- Install PuTTY, a free SSH client for Windows: Just download `putty.exe` from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

> You might need to scroll down to the middle of the web page to locate the link for `putty.exe`.

- Click the "client" node on the GENI slice page for "CS4121:lab0-yourInitial", take notes of the "SSH To"

line where url and port number are shown, e.g. `zxu@pc2.geni.it.cornell.edu:26090`

- Do the same for the "Server" node.
- Click your name at the top-right corner of the GENI Portal homepage, then SSH Keys.
  - Click **Download PuTTY Key**.
- Run PuTTY.
- Then
  - On the Basic options screen, in the Host Name field enter the url you noted above, e.g. `zxu@pc2.geni.it.cornell.edu`
  - In the Port field enter the port number you noted above, e.g. `26090`
  - Make sure Connection type is: SSH
  - Under the settings categories on the left navigate to Connection-> SSH ->Auth.
  - Next to the "Private key file for authentication" field at the bottom, click Browse... and select the PuTTY key file you saved to your computer, and click Open.
  - Click Open to establish the SSH connection.
  - If prompted about whether you trust the host (key not cached in registry), click Yes.
  - When prompted for the Passphrase, enter your Passphrase.
- If you see the prompt `yourname@client:~$` , you have successfully logged into the "client" node.
- Do the same to log into the "server" node.

5. What to Turn in?

Submit the following three screenshots in three **separate** files (you may name them any way you want):

- Homepage of your GENI slice "CS4121:lab0-yourInitial" where all nodes have turned green.
- An SSH terminal to the "client" node. Depending on the OS system that you use, you may choose one of the two options listed in Section 4 above.
- An SSH terminal to the "server" node.

6. Warnings

- I don't take late submissions. Don't even bother.
- This lab serves as the prerequisite to all other subsequent GENI activities down the road, i.e. you will **NOT BE ALLOWED** to work on any of them until you have successfully completed this lab. Consequently, you will lose all points for those GENI activities that you miss because of that.