

Steps to create a test bed on GENI

1. Log into www.geni.net
2. Click on “Use GENI”
3. In portal, in the text field enter “another” or if just drop down is available, select “GENI Project Office”
4. Login with your credentials (If account is not created, Click on request login and fill details)
5. Once login is successful, you should be seeing Multi_Node_Label_Routing in Projects section like below

The screenshot shows the GENI Portal interface. At the top, there is a navigation bar with links for Home, Tools, Partners, Help, and a user profile for Pranav Sai Kethe. Below the navigation bar, a notice box states: "Notice December 14, 2015: GENI Portal Operations is on holiday. Support, account and password change requests, and project lead requests will be delayed. Normal operations resume the week of January 4, 2016." The main content area has tabs for Slices, Projects (which is selected), Logs, and Map. Under the Projects tab, there is a "Projects" heading and a search/filter section with "Active projects" and "Sort by: Project name" options, with "Sort ascending" checked. Below this, there are two buttons: "Join a Project" and "Ask to be a Project Lead". A modal window is open over the content, showing a project card for "Multi_Node_Label_Routing". The card includes the project name, a three-dot menu icon, the lead "Nirmala Shenoy", a note "No slices", and a status message "Project expires in 684 days" with a green checkmark icon.

6. If you don't see this, click Join a Project (blue button here)
7. In “Select a project to join” page, select **Multi_Node_Label_Routing** project, project lead **“Nirmala Shenoy”**
8. Once part of a project, to create a test bed, go to ‘Slices’ section in the screen shot above
9. Click on “New Slice”
10. Fill the ‘slice name’ and ‘description fields’ and click ‘create slice’ button. (Pick any other slice name)

The screenshot shows the GENI Portal interface. At the top, there is a navigation bar with links for Home, Tools, Partners, Help, and a user profile for Pranav Sai Kethe. A notice banner at the top left states: "Notice December 14, 2015: GENI Portal Operations is on holiday. Support, account and password change requests, and project lead requests will be delayed. Normal operations resume the week of January 4, 2016." Below the notice, the main content area has a title "Create New Slice". It contains a form for creating a slice, with fields for Project name (Multi_Node_Label_Routing), Slice name (test), and Slice description (Meshed Tree Protocol test). Below the form, two notes are displayed: "Note: Slice names must not contain whitespace. Use at most 19 alphanumeric characters or hyphen (no leading hyphen) : "a-zA-Z0-9-"" and "Note: Slice names are public and must be unique across your project." At the bottom of the form are "Create slice" and "Cancel" buttons. The footer of the page indicates "GENI Portal Version 3.8".

11. Once slack is created you should see the following with no resources

The screenshot shows the GENI Portal interface. At the top, there is a navigation bar with links for Home, Tools, Partners, Help, and a user profile for Pranav Sai Kethe. Below the navigation bar, a menu bar includes "Resources" (which is selected and highlighted in dark grey), "Aggregates", "Map", "Members", "Info", and "Logs". A status message at the top left says "Slice: test Slice expires in 6 days ✓ Project: Multi_Node_Label_Ro... Project expires in 684 days ✓". To the right of this message are buttons for "Add Resources", "Renew", and "Tools". The main content area is titled "Manage Resources" and contains a message "No resources initialized: no resources". There is a "View Rspec" button in the bottom right corner of this section.

12. I will create a topology with three nodes

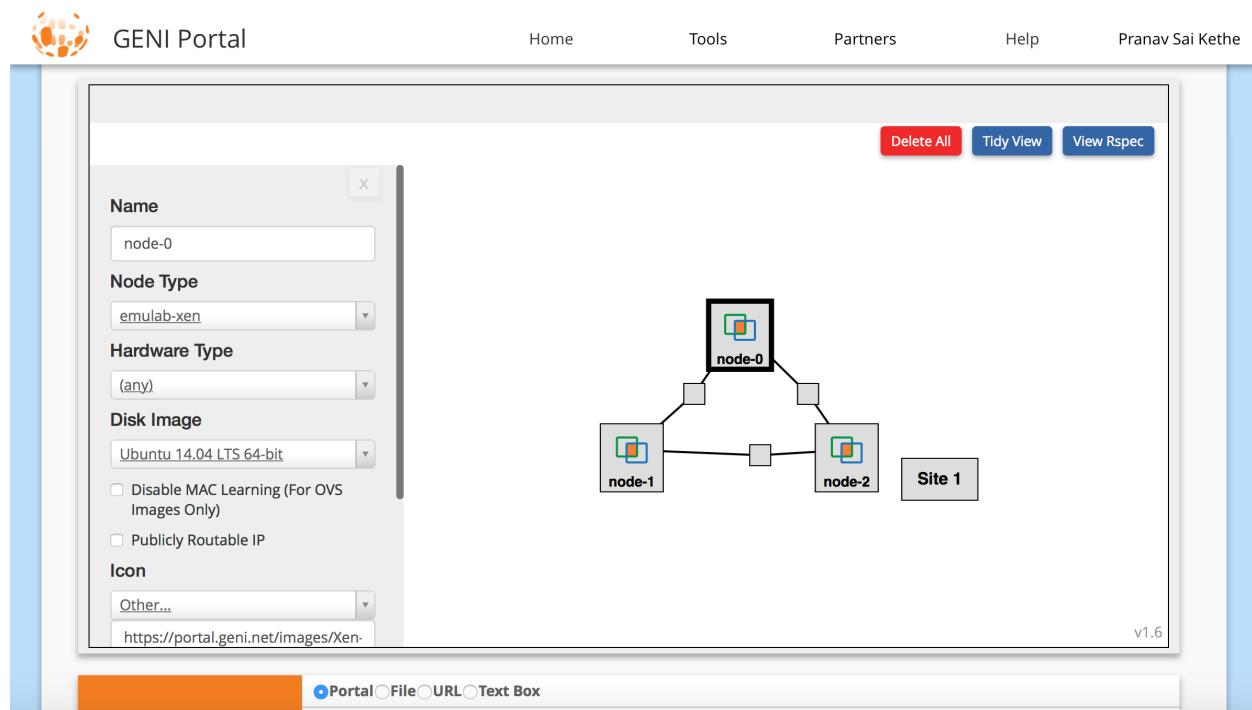
13. Click on “Add Resources” in the above screen

The screenshot shows the GENI Portal interface for adding resources. At the top, there's a navigation bar with links for Home, Tools, Partners, Help, and a user account. Below the navigation bar, a message says "To add resources you need to draw or choose a Resource Specification (RSpec)". A central panel titled "Drag to Add" contains icons for various resource types: VM, Xen VM, EG VM, Raw PC IG, Raw PC EG, and OF OVS. An orange button labeled "New Site" is located at the bottom left of this panel. To the right of the "Drag to Add" panel, a small box labeled "Site 1" is visible. At the top right of the main area are three buttons: "Delete All" (red), "Tidy View" (blue), and "View Rspec" (blue). The bottom right corner of the main area has the text "v1.6".

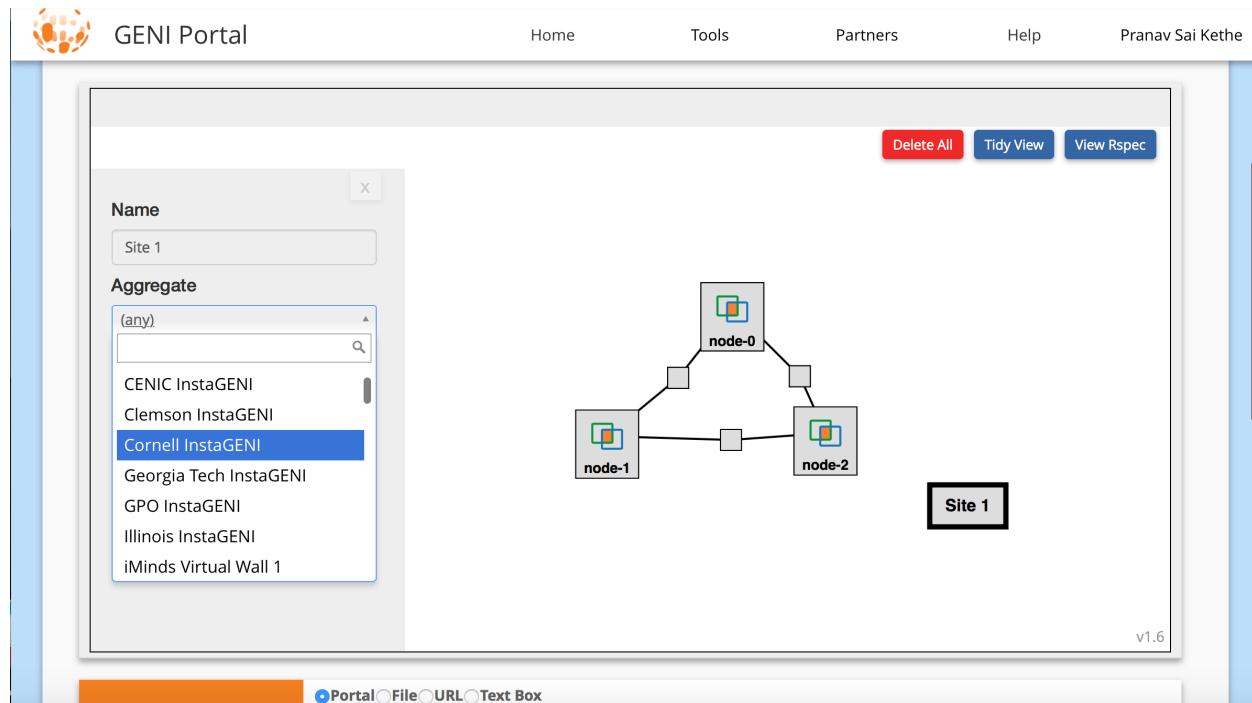
14. Drag “Xen VM” into the right pane, and create connections between them in a triangular fashion.(see figure below)

This screenshot shows the same GENI Portal interface after creating a network topology. The "Drag to Add" panel remains on the left, while the main workspace now displays three nodes labeled "node-0", "node-1", and "node-2". These nodes are arranged in a triangle, with lines connecting them to form a closed loop. Each node is represented by a square icon containing a green and orange "Xen VM" symbol. The "Site 1" label is still present on the right. The top right buttons ("Delete All", "Tidy View", "View Rspec") are visible. The bottom navigation bar includes links for "Portal", "File", "URL", and "Text Box".

15. Click on each node created in the above and change the Disk Image in the left pane section to “Ubuntu 14.04 LTS 64-bit (**Do this on all the nodes**)



16. Next click on “Site 1” box seen in the screenshot above, you will see a list of universities hosting GENI test beds. You can pick any one from the list.



17. Once the above step is completed, scroll to the bottom of the page and click ‘Reserve Resources’
18. Creation of test bed takes about 10 -15 minutes
19. After 10 -15 minutes go back to your slice, you should be able to see all the nodes in green similar to below screenshot.

GENI Portal

Home Tools Partners Help Pranav Sai Kethe

Manage Resources

Resources on Cornell InstaGENI are ready.

View RSpec

node-0
node-1
node-2

Renew Renew Date Delete SSH Restart Snapshot Details Add Resources Expand

GENI Portal Version 3.8
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Steps to run MTP on testbed



1. MTP repository is on github at <https://github.com/pkethe/MTP/tree/develop>
2. Every node needs to have a clone of MTP code, as the filesystem is not shared.
3. Before doing ssh to each node, we have to copy the ssh keys to `~/.ssh/` (This should be same for MAC and Linux)
4. In the below screen on right, under your username, click on 'SSH Keys' (Follow instructions in this page)

The screenshot shows the GENI Portal interface. On the left, there's a sidebar with a user profile for "Pranav Sai Kethe" and links for Profile, SSH Keys (which is highlighted in orange), RSpecs, Manage Accounts, Preferences, and Logout. The main area is titled "Manage Resources" and displays a network graph with three nodes: node-0, node-1, and node-2. Node-0 is highlighted with a green border. On the left, there's a form for managing resources, showing fields for Name (node-0), SSH to (with two entries: pk6420@pc1.geni.it.cornell.edu:32826 and efgics@pc1.geni.it.cornell.edu:32826), Node Type (Other... with emulab-xen selected), and Hardware Type (any). Below the form are buttons for Renew, Delete, SSH, Restart, Snapshot, Details, Add Resources, and Expand. At the bottom right of the portal window, there's a footer with version information: "GENI Portal Version 3.8 Copyright © 2015 Raytheon BBN Technologies All Rights Reserved - NSF Award CNS-0714770 GENI is sponsored by the National Science Foundation".

5. Once keys are copied into `~/.ssh` directory and appropriate permissions are set, you can ssh to all the nodes using **ssh -i ~/.ssh/id_geni_ssh_rsa [username]@[hostname] -p [port]**
6. Username is the name used while logging into the portal, you can find this information by clicking on the node which you intend to ssh.

GENI Portal

Home Tools Partners Help Pranav Sai Kethe

Manage Resources

Resources on Cornell InstaGENI are ready.

Name: node-0

SSH to: pk6420@pc1.geni.it.cornell.edu:32826, efgics@pc1.geni.it.cornell.edu:32826

Node Type: Other... emulab-xen

Hardware Type: (any)

Actions: Renew Renew Date Delete SSH Restart Snapshot Details Add Resources Expand

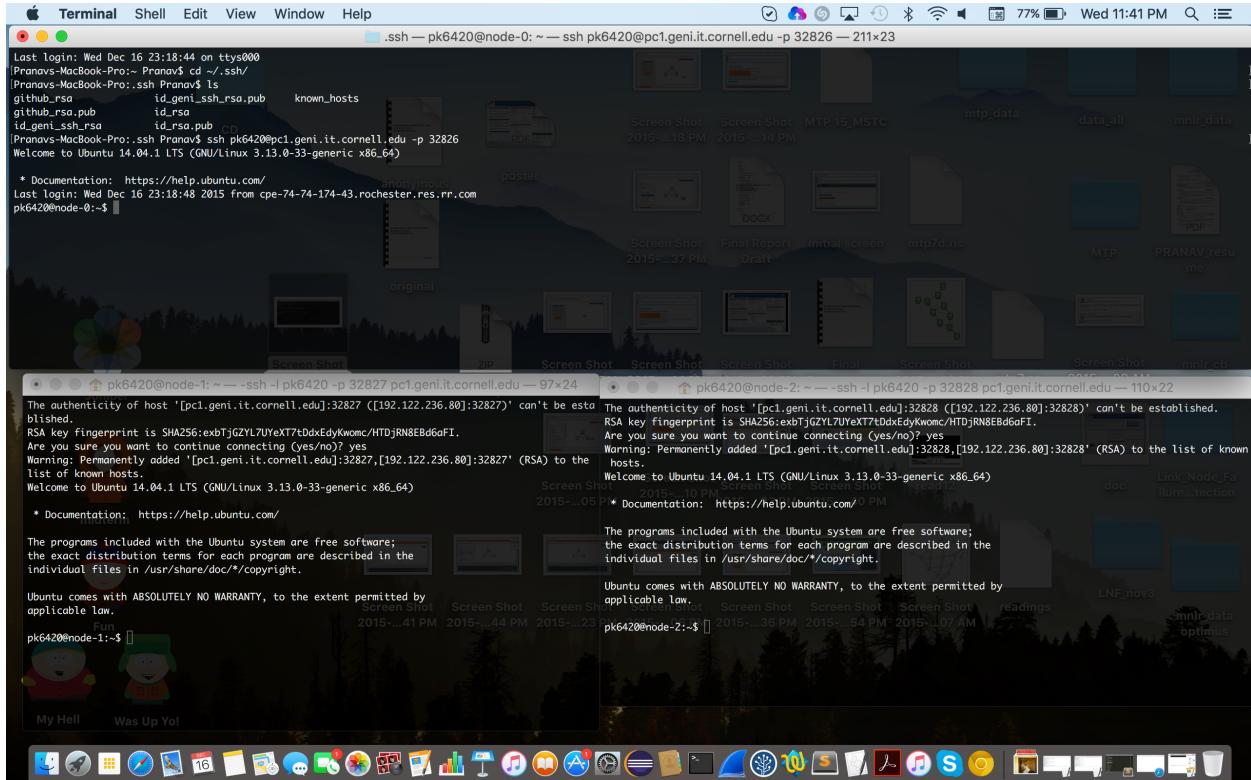
View Rspec

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7. In the above screenshot, you can see the port information on the left for **node-0**
8. Using the information above do the following to ssh (See below)

```
.ssh -- pk6420@node-0: ~ — ssh pk6420@pc1.geni.it.cornell.edu -p 32826 — 145x23
Last login: Wed Dec 16 23:18:44 on ttys000
[Pranav's-MacBook-Pro:~ Pranav$ cd ~/.ssh/
[Pranav's-MacBook-Pro:~.ssh Pranav$ ls
github_rsa      id_geni_ssh_rsa.pub      known_hosts
github_rsa.pub   id_rsa
id_geni_ssh_rsa  id_rsa.pub
[Pranav's-MacBook-Pro:~.ssh Pranav$ ssh pk6420@pc1.geni.it.cornell.edu -p 32826
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-33-generic x86_64)
nell.edu:32826.
* Documentation:  https://help.ubuntu.com/
Last login: Wed Dec 16 23:18:48 2015 from cpe-74-74-174-43.rochester.res.rr.com
pk6420@node-0:$
```

9. Alternatively, you can ssh to nodes using GUI, by clicking on the node you want to SSH and click on the SSH blue button.



10. Open ssh terminals for each node (see screenshot above)

11. Perform git clone on all the nodes (git clone <https://github.com/pkethe/MTP.git>)

```
pk6420@node-1: ~ — -ssh -l pk6420 -p 32827 pc1.geni.it.cornell.edu — 97x24
blished.
RSA key fingerprint is SHA256:exbTjGZYL7UYeXT7tDdxEdyKwomc/HTDjRN8EBd6aFI.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[pc1.geni.it.cornell.edu]:32827,[192.122.236.80]:32827' (RSA) to the
list of known hosts.
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-33-generic x86_64)

 * Documentation:  https://help.ubuntu.com/

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

pk6420@node-1:~$ git clone https://github.com/pkethe/MTP.git
Cloning into 'MTP'...
remote: Counting objects: 143, done.
remote: Total 143 (delta 0), reused 0 (delta 0), pack-reused 143
Receiving objects: 100% (143/143), 529.17 KiB | 0 bytes/s, done.
Resolving deltas: 100% (81/81), done.
Checking connectivity... done.
pk6420@node-1:~$
```

12. Next, change directory **cd MTP // Perform on all nodes**

13. Next, type **sh install** to compile MTP code which is in SRC // Perform on all nodes

14. All binaries are in **bin/**

```

Last login: Wed Dec 16 23:18:44 on ttys000
Pranav's-MacBook-Pro:~ Pranav$ cd ~/.ssh/
Pranav's-MacBook-Pro:ssh Pranav$ ls
github_rsa      id_geni_ssh rsa.pub    known_hosts
id_geni_ssh rsa  id_rsa        id_rsa.pub
Pranav's-MacBook-Pro:ssh Pranav$ ssh pk6420@pc1.geni.it.cornell.edu -p 32826
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-33-generic x86_64)

 * Documentation: https://help.ubuntu.com/
Last login: Wed Dec 16 23:18:48 2015 from cpe-74-74-174-43.rochester.res.rr.com
pk6420@node-0:~$ git clone https://github.com/pkethe/MTP.git
Cloning into 'MTP'...
remote: Counting objects: 143, done.
Receiving objects: 100% (143/143), 529.17 KiB | 0 bytes/s, done.
remote: Total 143 (delta 0), reused 0 (delta 0), pack-reused 143
Resolving deltas: 100% (81/81), done.
Checking connectivity... done.
pk6420@node-0:~$ cd MTP
pk6420@node-0:~/MTP$ cd MTP
-bash: cd: MTP: No such file or directory
pk6420@node-0:~/MTP$ sh install
pk6420@node-0:~/MTP$ 

pk6420@node-0:~$ ssh -l pk6420 -p 32827 pc1.geni.it.cornell.edu
list of known hosts.
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-33-generic x86_64)

 * Documentation: https://help.ubuntu.com/
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

pk6420@node-1:~$ git clone https://github.com/pkethe/MTP.git
Cloning into 'MTP'...
remote: Counting objects: 143, done.
remote: Total 143 (delta 0), reused 0 (delta 0), pack-reused 143
Receiving objects: 100% (143/143), 529.17 KiB | 0 bytes/s, done.
Resolving deltas: 100% (81/81), done.
Checking connectivity... done.
pk6420@node-1:~$ cd MTP
pk6420@node-1:~/MTP$ ls
broadcast  clean  Docs  install  README.md  SRC  Topologies
pk6420@node-1:~/MTP$ sh install
pk6420@node-1:~/MTP$ Yo!
```

15. To start root, type **sudo bin/mtpd 1 1** (mtpd <root/non root> <ID>)
16. To start non root, type **sudo bin/mtpd 0**
17. Latest code is in develop, to checkout develop
18. Type **git checkout develop**
19. Type **git pull origin develop**
20. Do **sh install** on all nodes again
21. Now do step 15 on Node-0
22. do step 16 on node-1 and node-2

```
apple-terminal Terminal Shell Edit View Window Help
pk6420@node-0: ~/MTP --ssh -l pk6420 -p 32826 pc1.geni.it.cornell.edu — 170x22
Child PVID PORT MAC
1.2 eth2 2:2a:7b:d9:10:c
1.1 eth1 2:6a:be:4b:0:63

#####Local Host Broadcast Table#####
PORT CD
#####Main VID Table#####
MT_VID Ename Path Cost Membership MAC
1 self 0 anonymous 1 0:0:0:0:0:0

#####Backup VID Table#####
MT_VID Ename Path Cost Membership MAC
1 self 0 anonymous 1 0:0:0:0:0:0

#####Child PVID Table#####
Child PVID PORT MAC
1.2 eth2 2:2a:7b:d9:10:c
1.1 eth1 2:6a:be:4b:0:63

#####Local Host Broadcast Table#####
PORT
Screen Shot 2015-18 PM Screen Shot MTP_15_MSTC mtp_data
Screen Shot 2015-14 PM
data_all mnlr_data

#####Backup VID Table#####
MT_VID Ename Path Cost Membership MAC
1 self 0 anonymous 1 0:0:0:0:0:0

#####Child PVID Table#####
Child PVID PORT MAC
1.2 eth2 2:46:87:7d:2b:38
1.1 eth1 2:46:87:7d:2b:38

#####Local Host Broadcast Table#####
PORT
Screen Shot 2015-..43 PM Screen Shot 2015-..05 PM Screen Shot 2015-..40 PM
midterm
Screen Shot 2015-..10 PM Screen Shot 2015-..40 PM
Link_Node_Failure...techo

#####Main VID Table#####
MT_VID Ename Path Cost Membership MAC
1.1 eth1 1 1 2:46:c8:38:1:2
1.2 eth2 2 2 2:46:87:7d:1:1.2

#####Backup VID Table#####
MT_VID Ename Path Cost Membership MAC
1 eth1 1 1 2:b1:42:6c:4d:00
2 eth2 2 2 2:a2:2d:62:8:9a

#####Child PVID Table#####
Child PVID PORT MAC
1.1 eth1 2:46:c8:38:1:2
1.2 eth2 2:46:87:7d:1:1.2

#####Local Host Broadcast Table#####
PORT
Screen Shot 2015-..49 PM Screen Shot 4 PM Screen Shot 4 PM Screen Shot 4 PM
readings
Screen Shot 64 PM Screen Shot 64 PM Screen Shot 64 PM Screen Shot 64 PM
optimus
My Hell Was Up Yo!
```