# Lab 1 Experimentation Task Design

## Contents

Objective:	3
Submission:	3

## Objective:

In this lab, students can create a simple network topology in CloudLab. Students will login the Cloudlab website, create an experiment profile, and create a topology that includes four instances of XEN VM (Virtual Machine) linked together. The student will then instantiate the topology by selecting a cluster that is available. After the topology is instantiated, the student then sends Ping from one node to every other node to confirm that the topology is created successfully.

### Submission:

Complete step 1, 2, and 3. Attach the topology view screenshot. List the steps to create an experiment profile and explain how to test connectivity.

Students can refer to the link (http://docs.cloudlab.us/cloudlab-tutorial.html ) for more details about creating profiles on CloudLab. Students should have an account with either CloudLab, GENI, or any other federated services like EmuLab to access CloudLab. If you want to sign up for a CloudLab account, you need to select a project to join in when you register at CloudLab. Then you need to wait for the leader of the project to accept your registration.

CloudLab Login page: <u>https://www.cloudlab.us/login.php</u>

1) Create Profile

Create a profile with 4 Xen VMs. You can select UBUNTU16 as your choice of Operating System. Hardware type can be any. Node type will be emulab-xen. For the links select Link type as Ethernet. Give a name to the topology with a description. Once the topology has been created click on Accept and then create. In the next window instantiate the profile.

Experiments - Storage -							Docs
Start Experiment							
Create Experiment Profile							
Reserve Nodes							
Resource Availability	Name 👩	La1Topo		Project	SANTS2019Lab1	•	
My Experiments							
My Profiles	Source code 😡	Upload File Create Topology	Edit Code Or Git Repo				
My Reservations							
My History							Create
Resource Availability My Experiments My Profiles My Reservations My History	Name 0	La1Topo Upload File Create Topology	Edit Code Or Git Repo	Project	SANTS2019Lab1	•	Create

Figure 1: Start to create experiment profile. Click "Create Topology" to start.

#### **Topology Editor**

Drag to Add		Delete All Tidy View
ARM Server Bare Motal PC	node-0	immenni node-1
	1	Site 1
		node-2
		Accept Cancel

Figure 2: Drag to add nodes to your topology



Figure 3: To add a connection between two nodes, move mouse approach a node. A short black line appears. Then drag the line to the destination node.

 $\times$ 

х

#### **Topology Editor**



Figure 4: Give details of each node by selecting Node type, Hardware type, and Disk image. Remember to check "Require Routable IP" so that we can connect those nodes to an SDN controller later.



Figure 5: Give details of each link. Select Ethernet for Link type for this lab.

Experiments - Storage -			Docs	anurag0 -
Modify Profile	Source code 9	Edit Topology Edit Code Convert to geni-lib NEW		
Name: CloudlabTopo1 Version: 0 Project: CloudLab	Description 😡	Lab to create a simple Topology. 4 XEN Vms with Ubuntu 16 OS.		
Creator: anurag0 Created: May 28, 2018 8:11 PM	Instructions 😡	Provide optional instructions for users of your profile.		
		Show/Edit Tour		
		Who can instantiate your profile? <ul> <li>Anyone</li> <li>Only members of your project</li> </ul>		
	Copy She	Delete	instar	ntiate Save

Figure 6: Save and instantiate the profile

#### 2) Start Experiment

To start an experiment, select a cluster that is available. For this lab select the one that is available. You can check the availability by hovering on the Green dot next to each cluster name. Click on finish when done. It will take some time for the profile to boot up.

If you encountered an error when you try to start an experiment, you probably made some mistakes when you create the profile. In this case you should terminate the current experiment, though it has not been successfully started. This will release any resources it occupies. Then go back to your profile, check and modify it.

	cperiments - Sta	orage -			Docs anurag0 -
$\bigcirc$		1. Select a Profile	2. Parameterize	3. Finalize	
		Profile: CloudlabTopo1	Version: 0 Source		
		Please review the selections be	elow and then click Finish.		
		Name:	Lab1	LEGES LEGES	
		Advanced Options	Check Resource Availability	nees	
				Previous Finish	

#### Figure 7: Start experiment

3) Test connectivity through ping

Students can open the terminals for each node by clicking the respective node and selecting shell. Use "ifconfig" command to get the IP address of each node. From node-0 ping all other nodes to test connectivity.

State: Profile:	ready CloudlabTopo1
Profile:	CloudlabTopo1
Ownership	
Greated:	May 28, 2018 8:13 PM
Expires:	May 29, 2018 12:13 PM (in 16 hours)
Logs	Create Disk Image Copy Extend Terminate
	ifest Graphs

Figure 8: Topology view

Topology View	List View	Manifest	Graphs						
					Л				
					Console	node-1			
					Console Log				
					Reboot Reload	T T			
					Delete Node				
						ndde-2			
Click on a node for	more options	. Click and d	rag to move things	around.			Reload	Topo Run Linktest	Refresh Status

Figure 9: Open a new shell for each node.

```
Topology ViewList ViewManifestGraphsnode-0 **node-0 **node-3 *RXpackets:0errors:0dropped:0overruns:0carrier:0collisions:0txqueuelen:1RXbytes:0(0.0 B)anurag0@node-0:~$ping 10.10.4.1(0.0 B)TXPING 10.10.4.1(10.10.4.1.1)56(84)bytes of data.64bytes from 10.10.4.1:icmp_seq=1ttl=6464bytes from 10.10.4.1:icmp_seq=2ttl=6464bytes from 10.10.4.1:icmp_seq=3ttl=6464bytes from 10.10.4.1:icmp_seq=3ttl=6464bytes from 10.10.4.1:icmp_seq=3ttl=6464bytes from 10.10.4.1:icmp_seq=5ttl=6464bytes from 10.10.4.1:icmp_seq=5ttl=647C---10.10.4.1ping statistics ---5packets transmitted, 5received, 0%packet7C---0.10.4.1ping statistics ---5packets from 10.10.2.110.6(24)bytes of data.64bytes from 10.10.2.1icmp_seq=1ttl=647HNG 10.10.2.110.10.2.1icmp_seq=2ttl=647HNG 10.10.2.1:icmp_seq=2ttl=647HNG 10.10.2.1:icmp_seq=2ttl=647HNG 10.10.2.1:icmp_seq=2ttl=647HNG 10.10.2.1:icmp_seq=2ttl=647HNG 10.10.2.1:icmp_seq=2ttl=647HNG 10.10.2.1:icmp_seq=2ttl=647HNG 10.10.2.1:icm
```

Figure 10: Ping test

4) Terminate the experiment

Remember to terminate the experiment once all the tasks are completed.