CSCI 558L Fall 2014
Laboratory 10: OpenFlow based Custom Router
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In this lab we will experiment with an OpenFlow switch. OpenFlow is a networking technology that separates the control plane and data plane of networking switching so that many fast, but dumb switches (data plane) can be controlled by a centralized and smart controller (control plane). In OpenFlow these two components are an OpenFlow switch such as OpenVSwitch and an OpenFlow software controller such as POX, NOX, and many others. You are free to use any flavor of software switch and the controller.

The essential idea of OpenFlow is as follows: when a packet arrives at a switch port that does not match an existing flow table entry, the packet is forwarded to the controller. The controller examines the packet and makes a decision about how to handle the packet. The controller then forwards this decision back to the switch in the form of a flow table entry. Further packets matching this flow table entry are forwarded quickly without involvement of the controller.

There are three parts to this lab:
(1) Tutorial on OpenFlow (using specified switch and controller)
- Go through every part of the tutorial on the following link
    - https://github.com/mininet/openflow-tutorial/wiki
- This task is to be done individually. Everyone must go through the tutorial and submit a transcript of his/her work to the Moodle server on the specified date and time. This tutorial does not need DETER; therefore, DONOT use DETER to complete this part.

(2) Build a router for your custom network protocol from the previous laboratory using OpenFlow
- This part of the assignment is a group assignment.
- Once everyone in your group has completed the tutorial, you are to complete the work as a group.
- First, you are to adapt the directions on the tutorial to use **DETER Containers** and network simulation instead of VirtualBox and mininet. Replicate the learning switch on DETER.
- Once you become familiar with the use of OpenFlow within DETER, modify the OpenFlow script to enable proper routing of your custom packets.
- Build your network with 5 nodes; one node in the middle configured as an OpenFlow switch and the 4 nodes connected to the switch. One of the 4 nodes will function as the controller for the OpenFlow switch.
- Deploy four instances of your FTP like program on each node to send/receive packets to other 3 nodes. Each stream should be of different throughput to verify that the packets are going to the correct destination.
- Design different experiments to show your router's correct functionality and evaluate performance. Please describe your experiments and how it can be used to verify the correct functionality of your protocol and your router design.
- Please submit your lab report on router design, its functionalities, and its performance by the designated time and date.

(3) Demonstrate your custom router to the T.A.
- Demonstrate the workings of routers from both subgroups to the TA during your team time slot.