

## Exercise: SDN

### Instructions

- Students may work in groups in terms of analyzing and discussing the exercise, but each student must do the exercise independently and deliver a unique report. Any copy & paste attempts between students are easily discovered, and will lead to a failure.

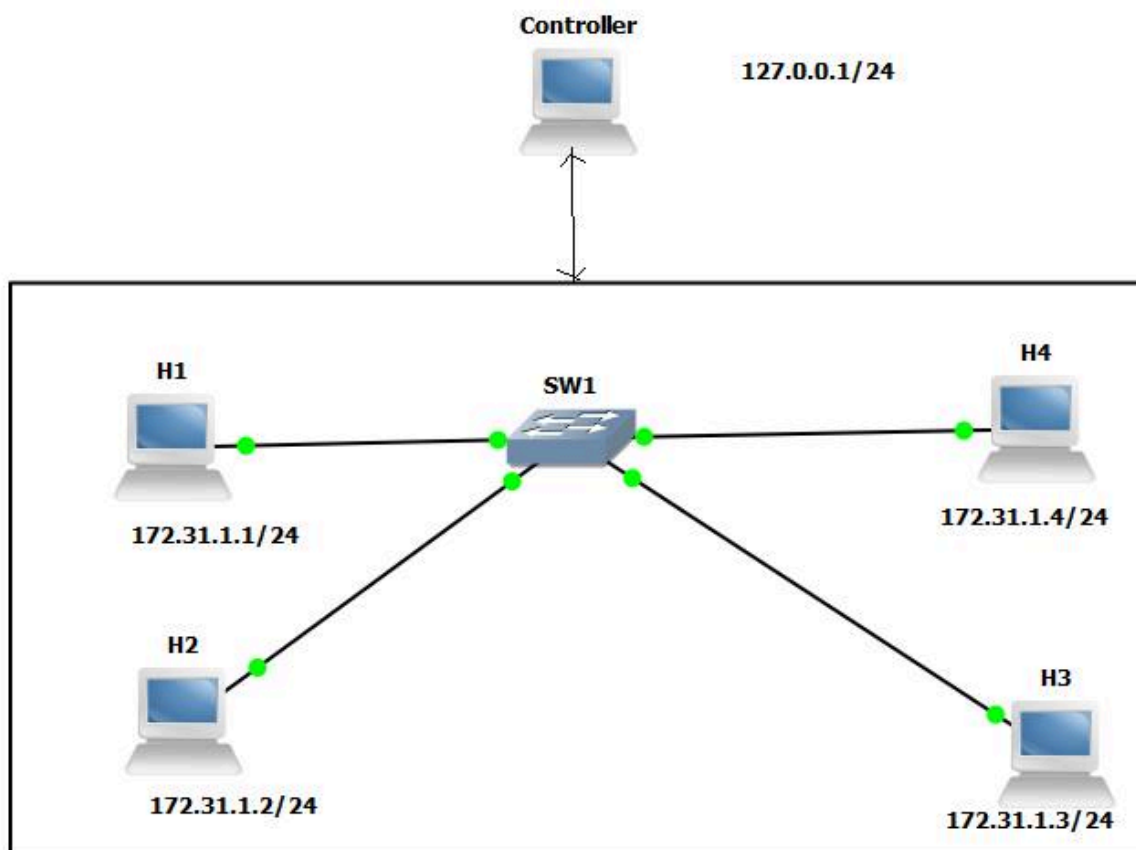
### Learning objectives

- To gain hands-on experience with SDN type of networks
- To better understand the difference between normal routed/switched networks and SDN controlled networks (“Network OS”)
- Understand relevant parts of the OpenFlow protocol v1.3 by capturing and analyzing it

### Getting Started

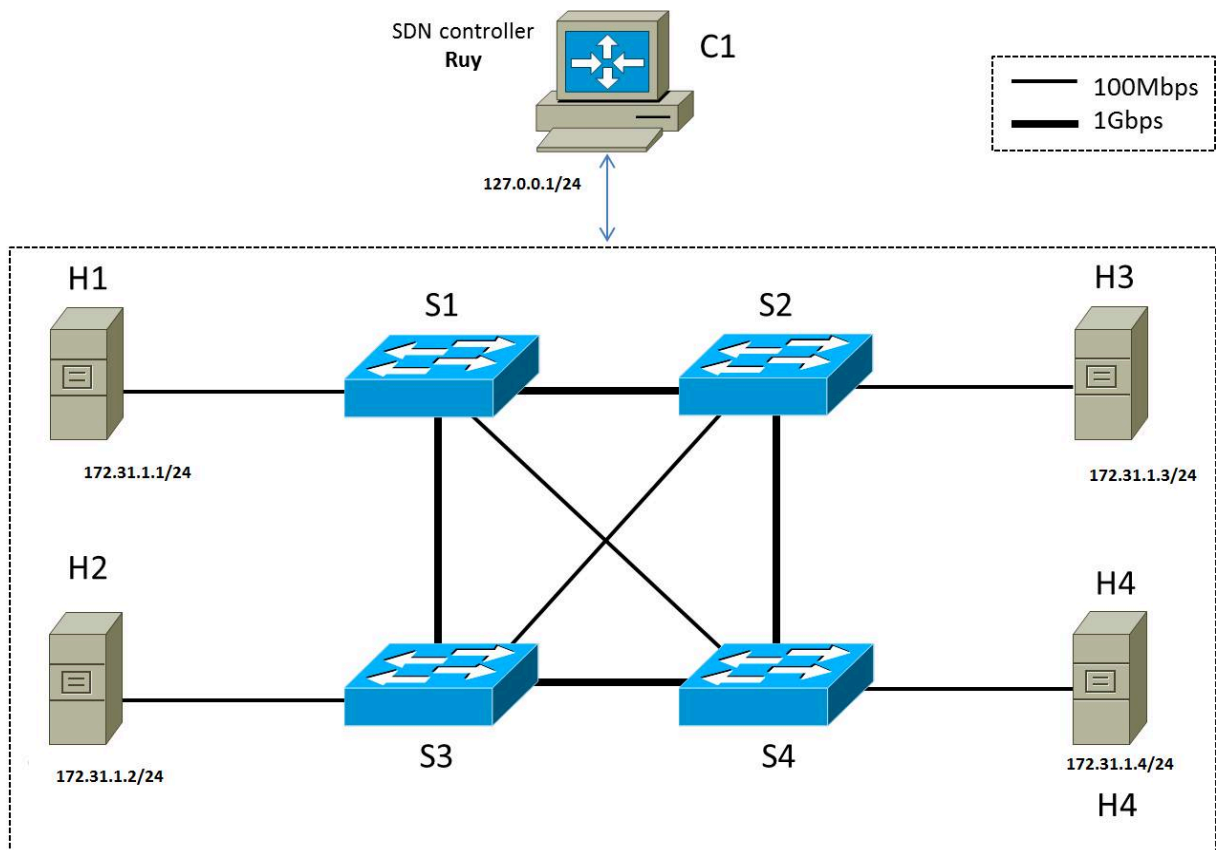
- All required softwares are installed in sahara lab. Open VirtualBox from terminal then start the ryu VM image, the username is 'ryu' with password 'ryu'.
- Access VM via SSH. Follow this link for details:

([http://archive.openflow.org/wk/index.php/OpenFlow\\_Tutorial#Ping\\_Test](http://archive.openflow.org/wk/index.php/OpenFlow_Tutorial#Ping_Test))



## Tasks

- Using mininet and the ruy controller, establish a network with a single switch (sw1) and four hosts (H1, H2, H3, H4). Use bandwidth of 100Mbps in all links. For understanding of mininet and sample examples, check <https://github.com/mininet/mininet/wiki/Introduction-to-Mininet>.
- Implement a rule in the controller which blocks ICMP echo request towards H1 and include description of the code in your report. For simplicity, all ARP traffics should be flooded.



- Establish the network illustrated above by implementing spanning tree protocol. Check that all hosts can ping with each other.
  - Using Wireshark to capture OpenFlow messages between the controller and switches
  - Describe the purpose of each message, and draw the OpenFlow message sequence diagram
- Analyze both networks in questions 1 and 2; state the main difference they have. What is the necessity of spanning tree protocol in the second network?
- What is the difference between the network implemented in LAB1 (Routed/switched network) and LAB 2 (SDN controlled network)?