# LAB 06
# Understanding packet switching in mininet openflow
### CO515: Advances in Computer Networks: Selected topics

## Install Mininet

Ensure Mininet is installed on your system. You can either run Mininet on a virtual machine (like a VM using VirtualBox or VMware) or in a Docker container. Below is an installation guide for Ubuntu-based systems:

```
# Update package lists
sudo apt-get update

# Install Mininet
sudo apt-get install -y mininet
```

## Create a Basic Mininet Topology

With Mininet, you can create a simple network topology to demonstrate packet switching. Here's an example of a simple network with two hosts and a switch:

```
# Launch Mininet with a basic topology (1 switch and 2 hosts)
sudo mn --topo single,2 --mac --switch ovsk --controller=ref
```

- This command creates a single switch with two hosts (h1 and h2) and uses Open vSwitch (OVS) as the switch type.
- The controller is set to reference (ref), which uses the default OpenFlow controller that comes with Mininet.

## Test Connectivity

After launching Mininet, you can test connectivity between the hosts using ping. This will demonstrate packet switching between hosts through the switch.

```
# Test connectivity between the hosts
mininet> h1 ping h2
```

If the ping is successful, the switch has successfully routed packets from h1 to h2.

## Use OpenFlow Rules to Control Packet Switching

Now, let's take a step further and create a custom OpenFlow controller to control packet switching behavior. We'll use “ryu”, a popular OpenFlow controller framework, to create a basic controller script that modifies packet routing.

Install ryu:
**sudo apt-get install -y python3-ryu**

## Tasks:

1. Create a simple Ryu controller (switch.py) that uses flow rules to switch packets between hosts

2. Start the Mininet topology with the custom controller:

**# Start the Ryu controller**
**ryu-manager switch.py**

**# Start Mininet with a custom controller (specify the IP and port of the Ryu controller)**
**sudo mn --topo single,2 --mac --switch ovsk,protocols=OpenFlow13 --controller=remote,ip=127.0.0.1,port=6633**

3. Test packet switching again by using ping or other connectivity checks.

**mininet> h1 ping h2**

4. You are required to submit the switch.py written by yourself and the test results.