Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam
(An Autonomous Institution, Affiliated to Anna University, Chennai)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Date: 28-09-2026

Course Code	**UCS3511**	Course Name	**Networks Lab**						
Course Type	**Lab**	Course Category	**Professional Core (PC)**	**L**	**T**	**P**	**TW & SL**	**TH**	**C**
				0	**0**	**45**	**0**	**45**	**1.5**
Regulation	**2024**		**Academic Year & Batch**	**2026-27 & 2024-28**					
Degree and Branch			**B.E. Computer Science & Engineering**						
Semester			**V**	**Section**	**A, B & C**	**K3, CO2**	**PI:** 1.1.2, 1.3.1, 1.4.1, 2.1.2, 2.1.3, 2.3.1, 3.1.1, 4.3.1, 5.1.1, 12.2.1, 12.3.1, 12.4.1 & 13.4.1		
Assignment No.	**12**	**Assigned Date**	**29-09-2026**	**Due Date**	**03-10-2026**				

Lab Assignment: Study of Mininet Simulator for Software Defined Networks (SDN)

Scenario

A network administrator wants to study the operation of a **Software Defined Network (SDN)** by creating a virtual network consisting of hosts, OpenFlow switches, and an SDN controller. Using the **Mininet simulator**, construct the network, configure the controller and switches, generate traffic between hosts, and observe the flow rules installed in the switches.

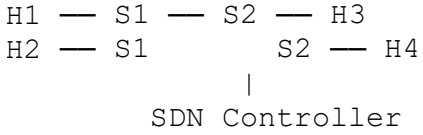
Tasks

1a. Create an SDN Topology

Using Mininet, create a network consisting of:

- 4 hosts (H1–H4)
- 2 OpenFlow switches (S1 and S2)
- 1 SDN controller (C0)

Connect the devices as follows:



Assign IP addresses:

Host	IP Address
H1	10.0.0.1/24
H2	10.0.0.2/24
H3	10.0.0.3/24
H4	10.0.0.4/24

1b. Start the Mininet Network

Create the topology using Mininet and verify:

- Hosts and switches.
- Network links.
- Controller connectivity.
- IP addresses.
- Switch connectivity.

Use appropriate Mininet commands such as:

```
nodes
net
links
dump
pingall
```

1c. Configure the SDN Controller

Connect the OpenFlow switches to the controller and verify that the controller is communicating with the switches.

Display the switch flow tables and identify the rules installed by the controller.

1d. Generate Network Traffic

Generate traffic between different hosts using:

```
ping
iperf
```

Perform the following communication:

- H1 → H3
- H2 → H4
- H1 → H4
- H3 → H2

Record the connectivity and traffic results.

1e. Observe Flow Rules

Examine the flow tables of S1 and S2 before and after traffic generation.

Identify:

- Match fields
- Source and destination addresses
- Input/output ports
- Packet counters
- Byte counters
- Flow duration

1f. Analyze SDN Behaviour

Observe how the controller manages forwarding decisions and how the flow rules affect packet transmission between hosts.

Record the changes in switch flow tables before and after generating traffic.

Test Cases

Test Case	Source	Destination	Traffic	Expected Observation
TC1	H1	H3	ICMP	Successful communication through S1–S2
TC2	H2	H4	ICMP	Successful communication through S1–S2
TC3	H1	H4	TCP	TCP traffic forwarded through the switches
TC4	H3	H2	UDP	UDP traffic forwarded through the SDN path
TC5	H1	H3	Repeated traffic	Flow counters should increase
TC6	H2	H4	Traffic after flow-table inspection	Observe existing/new flow rules

Sample Input

```
Number of Hosts       : 4
Number of Switches    : 2
Number of Controllers : 1

Controller            : C0
Protocol              : OpenFlow

H1 : 10.0.0.1/24
H2 : 10.0.0.2/24
H3 : 10.0.0.3/24
```

```
H4 : 10.0.0.4/24

Traffic:
Source                : H1
Destination           : H3
Protocol              : ICMP
Packets               : 10
```

Sample Output

```
*** Creating network
*** Adding controller
c0

*** Adding hosts
h1 h2 h3 h4

*** Adding switches
s1 s2

*** Creating links
h1-s1
h2-s1
s1-s2
s2-h3
s2-h4

*** Starting network
*** Testing connectivity

h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3

*** Ping test completed
0% packet loss
```

Sample Flow Table Observation

Switch	Source	Destination	Action	Packet Count
S1	H1	H3	Forward to S2	10
S2	H1	H3	Forward to H3	10
S1	H2	H4	Forward to S2	10
S2	H2	H4	Forward to H4	10

Performance Observation

TC	Source–Destination	Protocol	Packets Sent	Packets Received	Packet Loss	Flow Rules Observed
TC1	H1–H3	ICMP	10	10	0%	2
TC2	H2–H4	ICMP	10	10	0%	2
TC3	H1–H4	TCP	1000+	1000+	0%	2
TC4	H3–H2	UDP	1000+	1000+	0%	2
TC5	H1–H3	ICMP	20	20	0%	Existing rules/counters increased
TC6	H2–H4	ICMP	10	10	0%	Existing/new rules

The numerical values are sample/reference values and may vary with the Mininet and controller configuration.

Laboratory Record

Students should include:

1. Aim
2. Problem Analysis
3. SDN Topology Diagram
4. Mininet Topology Creation
5. Controller Configuration
6. Mininet Commands Used
7. Sample Input and Output
8. Test Cases
9. Switch Flow-Table Output
10. Performance Observation
11. Analysis of Flow Rules
12. Conclusion

Expected Learning Outcome

By completing this experiment, students will be able to **apply Mininet to create an SDN environment, configure an SDN controller and OpenFlow switches, generate network traffic, and observe the flow rules used for packet forwarding.**