Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

AY: 2025-26

Class:	TE.	**Semester:**	V
Course Code:	CSC501	**Course Name:**	CN

Name of Student:	SHRUTI GAUCHANDRA
Roll No. :	18
Assignment No.:	06
Title of Assignment:	SOFTWARE DEFINED NETWORK
Date of Submission:	15/10/25
Date of Correction:	15/10/25

Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	05
Demonstrated Knowledge	3	03
Legibility	2	02
Total	10	10

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Completeness	5	3-4	1-2
Demonstrated Knowledge Legibility	3	2	1
Legibility	2	1	0

Checked by

Name of Faculty : Mrs. SNEHA YADAV

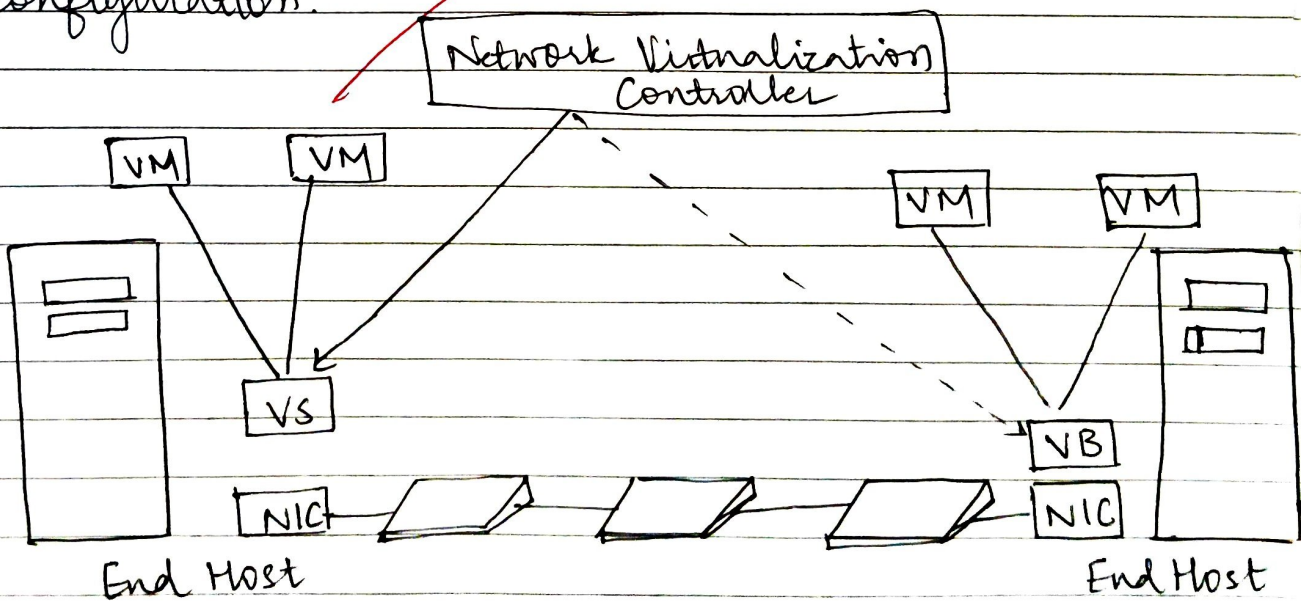
Signature :

Date : 15/10/25

CSC501.6 Apply Software Defined Network approach and methodology to manage dynamic and programmatically efficient network.

Q1. Given a network with OpenFlow switches, apply SDN virtualization techniques to create multiple virtual networks with independent policies. Identify the steps and controller configuration required.

→ The first widely adopted use case for SDN was to virtualize the network, virtual networks including both Virtual Private Networks (VPNs) and Virtual Local Area Networks (VLANs) have been as part of the Internet for years.
Compute virtualization made manual server provising a thing of the past and exposed the manual and time consuming processes of network configuration.

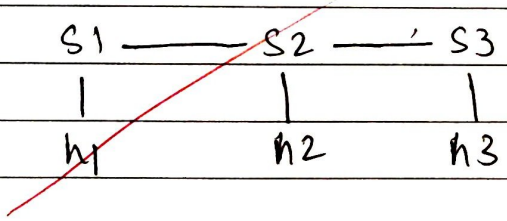


The Network Virtualization Controller is a SDN controller that exposes a northbound API by which networks can be created, monitored and modified.

Virtual networks are created by programming the virtual switches to forward packets from host to host access the underlay network.

Steps to follow -

Step 1. Physical Network Setup
Deploy OpenFlow-capable switches in physical network.
Connect them to a central SDN controller via OpenFlow protocol.



Step 2 Introduce a Network Hypervisor.
Use a network hypervisor like
- FlowVisor
- OpenVirtex

Step 3 Create Virtual Slices
Each slice represents one virtual network.

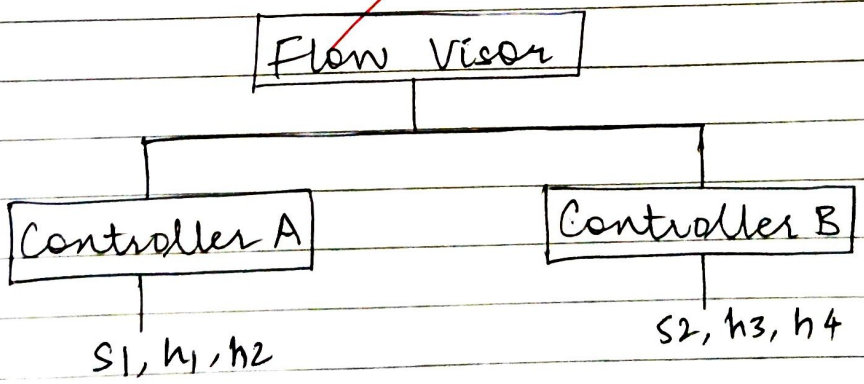
Step 4: Assign Controllers to Each Slice
Each virtual network gets its own SDN controller.

Step 5 Validate Network Isolation
Verify that flows from one virtual network do not affect the others.

Multiple virtual SDN networks share the same physical OpenFlow infrastructure.

Each has independent topology controller and flow policies.

Enables multi-tenacy, experimentation and isolation.

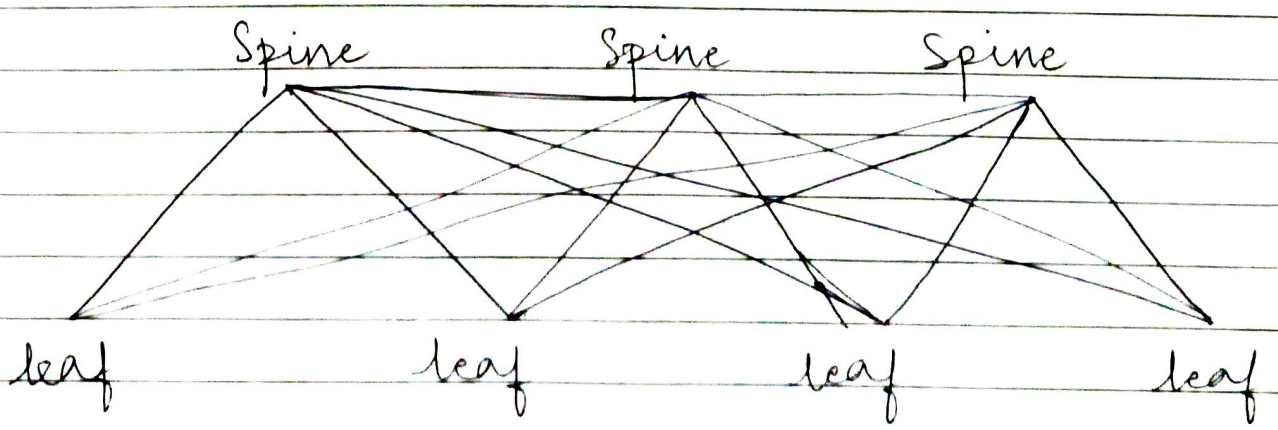


Q2. An enterprise network experiences congestion due to limited throughput in its switch backplane. Apply the concept of switching fabrics to redesign the architecture ensuring scalability in an SDN environment.

→ The problem is that an enterprise network is facing congestion due to limited throughput in its switch backplane.
The single-switch architecture cannot handle the growing traffic between servers, leading to high latency, packet drops and scalability limitations.

To overcome this, the architecture must be redesigned using switching fabric concepts integrated with Software Defined Networking (SDN).

Switching Fabric
It interconnects multiple smaller switches to replace a single monolithic backplane.



Leaf switches connect to end hosts or server, while spine interconnects all leaves.

An SDN controller centrally manages the fabric using OpenFlow or similar protocols.

Implementation Steps:

1. Analyze network congestion points and identify bandwidth heavy flows.
2. Deploy or Spine-Leaf fabric using OpenFlow capable switches.
3. Integrate an SDN Controller for centralized control and monitoring.
4. Monitor link utilization and flow statistics via telemdy
.
5. Scale horizontally by adding more spines/leaves without rearchitecthure.

By apply the concepts of switching fabrics through spine leaf topology and SDN control, the enterprise network becomes scalable, congestion free and programmable.