Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

AY: 2025-26

Class:	TE-AIDS	Semester:	V
Course Code:	CSC 501	Course Name:	CN

Name of Student:	Divya Davane
Roll No. :	14
Assignment No.:	6
Title of Assignment:	Enterprise Network & SDN
Date of Submission:	15.10.25.
Date of Correction:	

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 :

Signature :

Date : 15/10
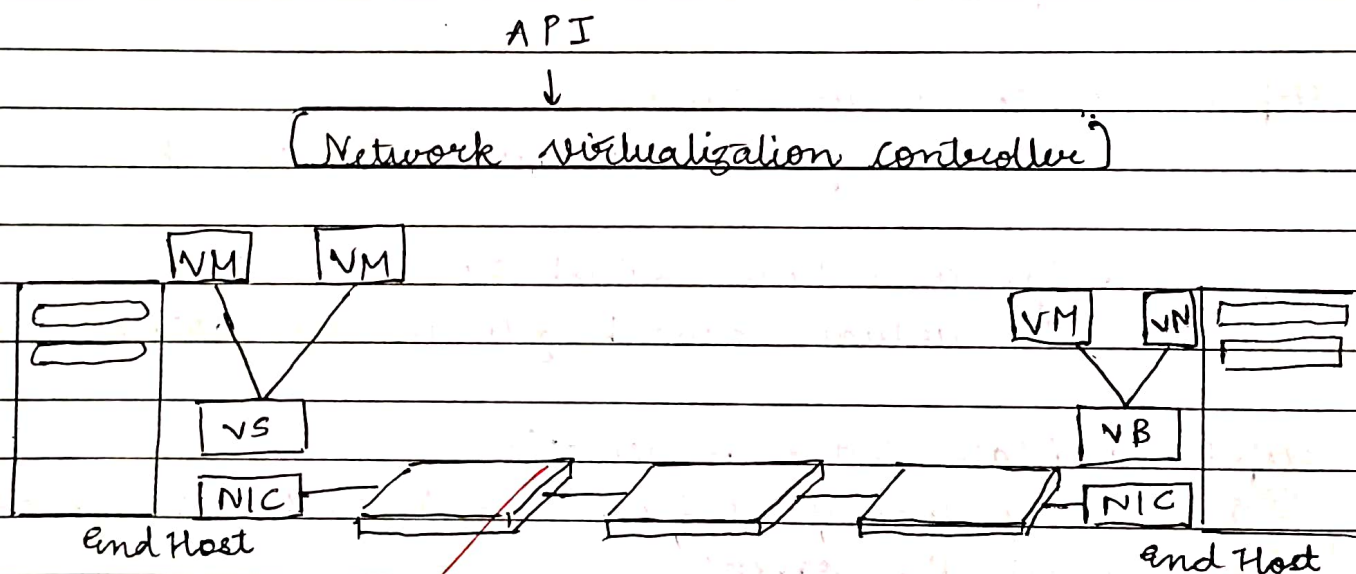
1. Given a network with OpenFlow switches, apply SDN visualization technique to create multiple virtual networks with independent policies. Identify the steps and controller configuration required.

Sol^n The first widely adopted use case for SDN was to virtualize and network, virtual network including both virtual private Networks (VPNs) and virtual local area Networks (VLANS) have been a part of the Internet for years. Compute virtualization made manual service provising a thing of the past and exposed the manual and time consuming processing of network configuration.

API
↓
(Network virtualization controller)


```
[VM]  [VM]                              [VM]  [VN]
[===]                                          [===]
[===]                                          [===]
  [VS]                                    [VB]
  [NIC]——————————————————————————————[NIC]
End Host                                      End Host
```

The Network Virtualisation controller is an SDN controller that exposes a northbound API by which networks can be created, monitored and modified.
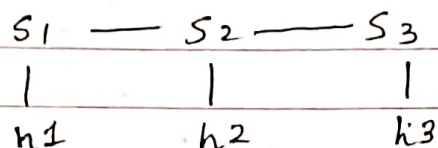
Virtual networks are created by programming the virtual switches to forward packets, from host to host across the underlay network.

Steps to follow -

step I. Physical Network Setup

- Deploy openFlow - capable switches in physical network. connect them to a central SDN controller via openFlow protocol.

$$S_1 — S_2 — S_3$$
$$|\qquad\quad|\qquad\quad|$$
$$h1\qquad h2\qquad h3$$

Step 2. Introduce a Network Hypervisor

Use a network hypervisor slice

- FlowViser
- operuirtex

Step 3. Create virtual slices.

Each slice represents one virtual network

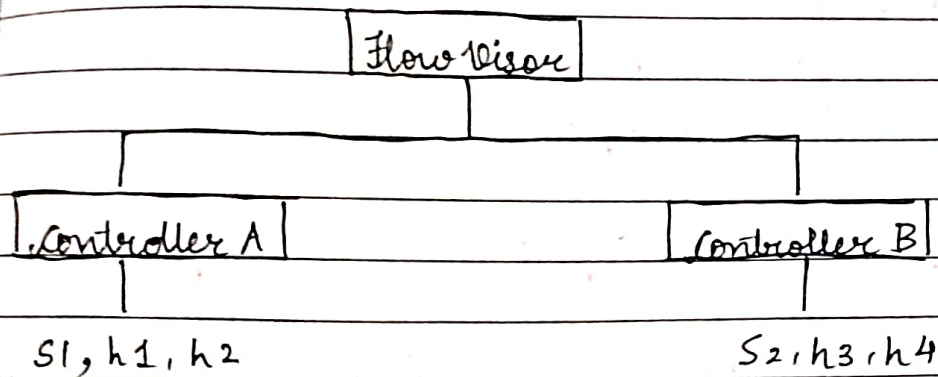**Step 4.** Assign controllers to each slice

Each virtual network gets its own SDN controller.

step 5. Validate Network isolation

Verify that flows from one virtual network do not affect the owers.

- Multiple virtual SDN networks share the same physical openFlow infrastructure.
- Each has independent topology controller and flow policies.
- Enables multi-tenancy, experimentation and isolation

```
                    ┌──────────────┐
                    │  Flow Visor  │
                    └──────┬───────┘
          ┌────────────────┴────────────────┐
┌─────────┴──────────┐            ┌──────────┴─────────┐
│   .Controller A    │            │   Controller B     │
└─────────┬──────────┘            └──────────┬─────────┘
          │                                  │
    S1, h1, h2                          S2, h3, h4
```

Q.2. An enterprise network experiences congestion due to limited throughput in its switch backplace. Apply the concept of switching fabrics to redesign the architecture ensuring scalability in an SDN environment.

Sol^n The problem is than an enterprise network is facing congestion due to limited throughput in its switch f 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
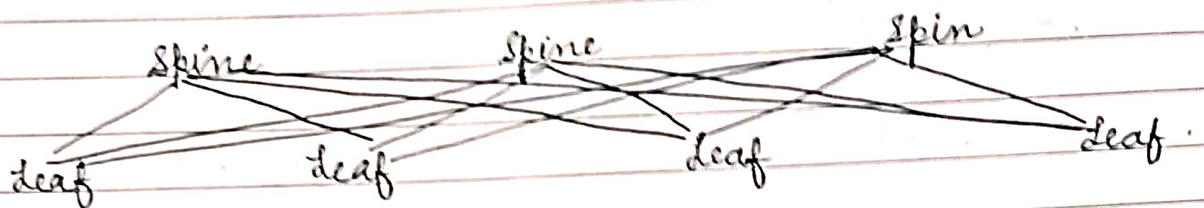
Leaf switches connect to end host or server while spine interconnect all leaves

• An SDN controller centrally manages the fabric using openFlow or similiar protocols.

→ Implementation Steps –

1. Analyze network congestion points and identify bandwidth heavy flows.

2. Deploy or spine-leaf fabric using open flow capable switches

3. Integrate an SDN controller for centralized control & monitoring.

4. Monitor link utilization & flow statistics via telemony

5. Scale horizontally by adding more spines / leaves without rehierarcbding.

Therefore, enterprise network becomes scalable, congestion free and programmable.