LAB 09
Simulating a Data Center Network environment
CO515: Advances in Computer Networks: Selected topics

Objective

The purpose of this lab session is to familiarize with the fundamental concepts and practical aspects of data centre networks, including topology, architecture, and basic configurations.

Required application tools:

- Network simulation software (e.g., Cisco Packet Tracer, mininet, GNS3)

Activity 1: Understanding Data Centre Network Topologies

Objective: To understand different types of data centre network topologies and their advantages.

Guide:

- Read: Review the provided material on data centre topologies (e.g., 3-tier, spine-leaf, and mesh topologies).
- Identify: List the key characteristics of each topology.
- Diagram: Draw diagrams of each topology using network simulation software.
- Analyze: Discuss the advantages and disadvantages of each topology in a group discussion.

Deliverables:

- Diagrams of 3-tier, spine-leaf, and mesh topologies
- A comparison table of the topologies

Activity 2: Exploring Data Centre Architecture

Objective: To explore the architecture of modern data centres, including core, aggregation, and access layers.

Guide:

- Read: Study the architecture of a typical data centre network.
- Diagram: Create a diagram that illustrates the core, aggregation, and access layers.
- Describe: Write a brief description of the functions of each layer in the data centre architecture.

Deliverables:

- Data centre architecture diagram

- Description of each layer's functions

Activity 3: Basic Network Configuration

Objective: To perform basic network configurations on data centre switches and routers.

Guide:

- Setup: Use network simulation software to set up a simple data centre network with switches and routers.
- Configure: Perform basic configurations, including IP addressing, VLANs, and inter-VLAN routing.
- IP Addressing: Assign IP addresses to devices.
- VLANs: Create VLANs and assign ports to VLANs.
- Inter-VLAN Routing: Configure routing between VLANs.
- Verify: Test the network configuration by pinging devices across VLANs.

Deliverables:

- Screenshots of configuration commands and results
- A brief report on the configuration steps and outcomes

Activity 4: Introduction to Network Virtualization in Data Center Networks

Objective: To understand the concept of network virtualization in data centres.

Guide:

- Read: Study the use of network virtualization, including VLANs, VXLANs, and SDN (Software-Defined Networking).
- Configure: Set up a basic 3 tier data center architecture using SDN simulation software.
- Analyze: Discuss the benefits of SDN in data centre environments.

Deliverable:

- Diagram and virtual network configuration
- Summary of network virtualization benefits

Submission: Submit the following documents to your instructor by the end of the lab session:

1. Diagrams and comparison table from Activity 1
2. Architecture diagram and descriptions from Activity 2
3. Configuration screenshots and report from Activity 3
4. Virtual network configuration and summary from Activity 4