Assignment 1
Russell Jalal

Introduction

This report details the setting up of an IT infrastructure consisting of two Windows Server virtual machines and a Windows 11 client machine. The environment was interconnected using a Layer 3 Cisco switch with RADIUS authentication enabled to ensure secure access. Active Directory and DHCP services were implemented to manage network resources efficiently.

Hardware and Virtualization Setup

I was provided with an Intel NUC machine running VMware ESXi. To begin, I erased all previous configurations and installed a fresh copy of VMware ESXi. After installation, I configured the system with my credentials and assigned the appropriate network settings to ensure seamless communication with the rest of the network.

Network Configuration

A Layer 3 Cisco switch was used to minimize errors and facilitate efficient routing. I reset the switch to factory settings and configured basic inter-VLAN routing to enable communication between the classroom computer and the VMware ESXi machine. The classroom computer was assigned specific IP addresses to ensure all devices were within the designated subnet. Additionally, the default gateway on both the NUC machine and the classroom computer was set to ensure proper connectivity.

Virtual Machine Deployment

After accessing VMware ESXi through the classroom computer's browser, I installed a Windows Server 2022 virtual machine. Following this, I segmented the network into five VLANs for enhanced security. The Layer 3 Cisco switch was configured to support IP routing so that all VLANs could communicate. A critical aspect of this configuration was setting the Intel NUC's connection port as a trunk port, allowing traffic from multiple VLANs to communicate with the VMware ESXi environment. Each VLAN was assigned an IP address to serve as the default gateway for its respective subnet.

External Connectivity

Per the provided instructions, I configured the switch to access a webpage hosted on the teacher’s switch. This was achieved by connecting my switch to the teacher’s switch and adding a static route entry to enable access to the webpage.

DHCP and Secure Access Configuration

To simplify IP address assignment, I configured DHCP on one of the Windows Server virtual machines, ensuring all client VLANs received IP addresses automatically. On the Cisco switch, I implemented essential security measures, including Message of the Day

(MOTD) banners, SSH access, and securing unused ports. Additionally, I configured Switch Virtual Interfaces (SVIs) for efficient network management.

Active Directory Deployment

Once basic network communication was established between the classroom computer and the ESXi machine, I installed Active Directory Services on the first Windows Server virtual machine. I created a forest and a domain, followed by installing another Windows Server virtual machine and joining it as a secondary domain controller. User and administrator accounts were created as needed. Next, I installed a Windows 11 client machine and joined it to the domain.

Automation and User Management

Using PowerShell scripts, I imported a list of employees from a .CSV file into an Organizational Unit (OU) in Active Directory. Additionally, I created a second PowerShell script to export the list of users in the OU to a text file and scheduled a task to run this process automatically every week.

Security Enhancements

To enhance security, I enabled RADIUS authentication on the Cisco switch and configured it on the Windows Server, restricting switch access to authorized users within the Network OU. I also installed a TFTP server on one of the Windows Servers and ensured that the Cisco switch could back up its configuration to this server.

Conclusion

This IT infrastructure setup successfully implemented a secure and well-structured environment, integrating VMware ESXi, Windows Server, Windows 11, Cisco networking equipment, Active Directory, DHCP, and security measures such as VLAN segmentation, RADIUS authentication, and automated backups. The configuration ensures streamlined network management, efficient resource allocation, and enhanced security within the environment.