

Delonta Johnson

Sam Sawyer

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Introduction

Networks are a system of interconnected computers and other electronic devices that communicate with each other through basic communication protocols and universal digital systems. Following unique signatures and other rules and regulations as provided by the network's administration and security protocols, a network provides and regulates secure and reliable local communications. In this project we aim to create a network with enough storage to hold a few thousand unique members as well as design the base system to include a DNS server, a user database, a group policy manager, and client user systems. Creating a mock server-based network, we're designing a safe and efficient system for Strome College of Business. Using two client computers and a server management system, we plan to program a server to meet three major requirements; a DNS system built to host a little over four thousand users including faculty and students, a security system designed to filter and permit different types of traffic, and a group policy built around distribution and management of resources.

Network Overview

Currently, The Strome College of Business is built to host thousands of students and a few hundred faculty including security, systems administrators, the office of the dean of Strome College, teachers, and many different faculty members. As per this project, we have been asked to design a system very similar to theirs with a lot more simplicity and a manually designed network unique to our talents as system administrators. The new system is built to create an environment built by and for students at the Strome College of Business, covering two labs with forty machines in each, the systems will be designed to create a safe and productive environment for studies and a multifunctional system for faculty and administrative users. The lab environments will be separated into two different groups; Business majors, and IT majors, and

then an in-between group of faculty. Business majors will only be able to access business systems and have unique rule systems in place, while IT majors will only be able to access IT systems and have access to drives and files that business majors won't need. Lastly, faculty will be permitted to access any of the 80 systems built and create and install new programs as needed, which is not permitted to any other users.

Requirements Analysis

Network Domains are a system of interconnected computers (or other resources) that are run off a Domain Controller and connect clients and forward information as needed for the network. For this Assignment, we are creating a system capable of hosting 80 clients and storing the user information of 4100 users imported from a spreadsheet file. Storing the information of so many clients, the allocation of resources focuses primarily on the client side, with the host storing and controlling data through group policies and primarily using the domain system to provide unique storage groups for each computer lab. Using the host to store the important information, our group focused primarily on securing the information and separating it into two groups; IT storage which is only accessible by IT users, and Business storage which is only accessible by business users. In addition to each group's associated majors, faculty will be permitted access to both storage groups, meaning their login will be universal within the system. To allow a proper amount of space for each work group, we have assigned 100 MB of space for business, 250 MB for IT, and 1GB for faculty.

Domain Controller Configuration

To configure the domain controller two hosts were set up with the Windows 2019 ServerA domain controller ensuring user authentication and verification within an active domain. Two domains, Domain Controller A and Controller B were configured as the primary domain

controllers for the networks. Domain controllers are utilized within the network to optimize speed and performance. Before setting up the domain controllers, a Host setup was conducted. This configuration ensures that the Host is properly compatible with the network. Within the 'Add Roles in Features' section of the manage menu, Server for NFS, Client for NS, File Resource Manager, and DFS Replication were selected. When configuring the domain controllers, the option that would allow the server to require a role-based or features-based installation was selected.

Next the server pool was selected to the domain controller using the IP address of the host machine. When given the option to select the role of the server, Active Directory Domain Services was assigned and installed to the host. Once installed, a DNS Server was configured into 'Domain Controller A'. To configure the DNS Server, DNS server tools were added to ensure proper configuration and accessibility to tools. Once done, Domain Controller B is added to the DNS Server. Two were added to the Forward Lookup Zones and Reverse Lookup Zones in each folder to optimize network performance. Next Group Policy Object configurations were done.

Users were added to both Domain Controller A and Domain Controller B in order for the configuration to work properly. User accounts are added by using the Active Directory computer and user tools. Within the Active Directory Users and Computers menu, the users were added to each domain controller folder to properly ensure configuration. A ping test ensured connection between both Domain Controllers was successful. Domain Controller settings and configurations were completed.

Client Computer Configuration

The client computer's Windows 2019 operating system had to be installed in order to be configured. From there, the client computer had to be added to the domain controller. First, a Host setup was conducted to ensure proper file sharing and server configurations were put in place. Next, each client computer had to be connected to the DNS Server. The client computers were given the IP address of domain controller A in order to be problem-added to the DNS server and become queried. This was done by going to the control panel and selecting the Network and Sharing Center. Once selected, “Change Adapter settings” were selected. After right-clicking the network adapter, the IPV4 properties were changed. The DNS server address is now the IP address of Domain Controller A.

Once done the client computers must be added to the domain. On each computer, File Explorer is open. Once open, “This PC” is right-clicked and the option Advanced System settings are selected. Under “Computer name” the “Change” option is selected. The domain SAWYER.ORG is selected. After a login test is conducted on all computers, all clients are successfully connected to the system. Next, Organization Units are created to properly distinguish IT students, Business students, and staff within the network. In the Active Directory Computers and Users tab, under the domain name SAWYER.ORG, I right-click the container I want the OU to be placed in and select a new Organizational Unit. This was done three times for IT students, business students, and faculty.

Next storage space must be appropriately allocated for each user. In order to allocate space properly, the settings are configured within the Disk management features of Domain Controller A. Disks marked “:D” are used specifically for Strome College of Business students. After allocating disk space to each section. The file resource manager tool within the server

manager is used. After opening the File Resource Manager window, Quota management was selected, and a new quota path with Disk “:D” was created. Each client computer was tested to ensure connection to the drive.

From here all we have to establish are permissions. Once you select the File and Storage Service from the Server Manager, I right-click and create a new share named “STROME”. Here three folders are created. Within each folder, I view its properties and ensure the respective users have access to their respective. From here, all configurations from the client side should be done.

Account Management

The accounts for our server are separated into 4 different access levels; IT, Business, Faculty, and Administration. Using our domain configuration, we are able to set the permission levels and the connections to each work group. We then created a spreadsheet listing the individual users as user IDs and set their work groups. Attached is a copy of the spreadsheet listing 4100 users and a script to run on PowerShell which will import the users and user types to our server. The IT majors are labeled IT and as the workgroup IT, Business majors are labeled BUS and as a business workgroup, Faculty is labeled as FAC and faculty work group. We use two columns on a spreadsheet with the work group names and then the user ID. While writing the script, we import the spreadsheet as a csv, then using Powershell commands we import the user IDs as users with generic passwords.

Security Measures

Several security methods have been implemented onto the server to ensure data integrity and accessibility. When configuring a client's account, the option to force the user to change the password at the next login is selected. This ensures that strong passwords are used and are less likely to fall victim to brute force attacks. Next, settings for the domains can be configured only

through Domain Controller A. This will ensure authentication and reduce the chance of network manipulation by any unauthorized agents. Permissions are set to ensure that students and faculty have the ability to access, read, or write documents. Any user not associated with the domain will be unable to access documents and files from the network.

Conclusion

The network plan for the Strome College of Business is integral for the learning and development of students, faculty, and staff. The understanding of network configuration and security ensures data is being properly stored, processed, and transmitted. The Domain controller configuration maintains authentication of users, verifying network access for all users. The client computers were configured to optimize performance, speed, and storage capacity for necessary users. Additional security measures are put in place to increase data integrity and security within the network. All users who access the network through the client computer will be allocated the appropriate resources. Overall, the network administration proposed by the document has the ability to sustain the university's network traffic and ensure all information in the network is available, accessible, and readable.