***Lab 2: Linux/UNIX Network Administration***

CNIT 34000

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# PROCEDURES

The procedure section below covers how to enable SSH from an Alma Linux to Ubuntu Linux machines, as well as how to use SCP to transfer files between the two. It also covers how to set up NFS between 2 UNIX machines and a Windows machine, as well as replace it with Samba for all machines. Exporting and mounting NFS and Samba shares include configuring of conf files and use of commands to mount. The procedure section also contains instructions on how to secure a UNIX machine for each operating system. Security enhancements include SELinux configuration, process accounting implementation, network service management, and update patching. Lastly, X-Windows installation and configuration for all three operating systems is covered.

The formatting key of the following section will obey rules below: buttons are **bold**; options are *italicized*; text entered into the computer is in Courier New style; menu and folder navigation are shown with the pipe symbol and are *italicized*: *Start | Programs | MS Office | Word*.

## Implementing SSH for Ubuntu

SSH is important to be implemented into Linux environments as it allows for access without going on that specific machine. This is done through OpenSSH.

1. Checked the box ‘Install OpenSSH’ during operating system install.
2. Made sure that it was installed by using the command cd /etc/ssh and viewing the configuration files.
3. Used sudo service ssh start and sudo service ssh status to view the status.
4. Used ssh echammon@10.19.2.36 to connect to the Alma Linux machine.
5. Used sudo scp ~/scptest echammon@10.19.2.36:/home/echammon to copy a file over ssh.

## Implementing SSH for Alma

SSH is important to be implemented into Linux environments as it allows for access without going on that specific machine. This is done through OpenSSH.

1. Checked the box ‘Install OpenSSH’ during operating system install.
2. Made sure that it was installed by using the command cd /etc/ssh and viewing the configuration files.
3. Used sudo systemctl start sshd to start the ssh session and sudo systemctl status sshd to view the status of the session.
4. Used ssh echammon@10.19.3.36 to connect to the Ubuntu Linux machine.
5. Used sudo scp ~/scptest echammon@10.19.3.36:/home/echammon to copy a file over ssh.

## Configuring NFS Server on Ubuntu

NFS server houses the host that holds the NFS share that is shared to the other machines with a mount.

1. Used sudo apt install nfs-kernel-server to install the NFS server package.
2. Created an NFS share with mkdir nfs\_share /var/.
3. Set the directory permissions with chown -R nobody:nogroup /var/nfs\_share.
4. Set file permissions with chmod 777 /var/nfs\_share.
5. Opened /etc/exports with *nano* and added a line for the nfs share:  
   /var/nfs\_share 10.19.2.36/24(rw,sync,no\_subtree\_check)  
   /var/nfs\_share 10.19.2.36/24(rw,sync,no\_subtree\_check)
6. Exported the file with exportfs -a.
7. Restarted the service with systemctl restart nfs-kernel-server*.*
8. Allowed firewall access with ufw allow from 10.19.2.36/24 to any port nfs.
9. Used ufw enable to enable the firewall.
10. Created mount points under /mnt with *mkdir* for almanfs, almasmb, windowsnfs, windowssamba.
11. Used chmod 744 for all of the mount points for read and write access from the other Linux machine.

## Configuring NFS Client on Ubuntu

NFS client needed to be installed on both machines so that it can mount the shared filesystem from the server machine.

1. Used apt install nfs-common to install nfs client.
2. Mounted the nfs share from the Alma and Windows with:  
   sudo mount 10.19.2.36:/var/nfs\_share /mnt/almanfs  
   sudo mount 10.19.1.36:/var/nfs\_share /mnt/windowsnfs
3. Tested by placing a file from both ends into the directory and touching it from the other end.

## Configuring NFS Server on Alma

NFS server houses the host that holds the NFS share that is shared to the other machines with a mount.

1. Used dnf -y install nfs-utils to install NFS server.
2. Used systemctl enable nfs-server.serviceand systemctl enable nfs-server.service to start NFS.
3. Entered mkdir nfs\_share /var/ to create a share in /var for NFS.
4. Set the directory permissions with chown -R nobody:nogroup /var/nfs\_share.
5. Set the directory permissions with chmod 777 /var/nfs\_share.
6. Opened /etc/exports with *nano* and added an entry for the share of /var/nfs\_share10.19.3.36(sync,rw) and /var/nfs\_share 10.19.1.36(sync,rw) to export the share to the Ubuntu and Windows machines.
7. Disabled firewalls with firewall-cmd –permenentwith the following flags:  
   --add-service=nfs  
   --add-service=rpc-blind  
   --add-service=mountd
8. Reloaded the firewall with firewall-cmd –reload.
9. Created mount points under /mnt for ubtnfs, ubtsamba, windowsnfs, and windowssamba.
10. Used chmod 744 for all of the mount points for read and write access from the other Linux machine.

## Configuring NFS Client on Alma

NFS client needed to be installed on both machines so that it can mount the shared filesystem from the server machine.

1. Installed mounting tools with yum install nfs-utils nfs4-acl-tools.
2. Enabled the service with systemctl start nfs-client.target.
3. Mounted the mount points to the nfs share with:  
   sudo mount -t nfs 10.19.3.36:/var/nfs\_share/ /mnt/ubtnfs.
4. Mounted the Windows mount point with:  
   sudo mount -t nfs 10.19.1.36:C:\nfs\_share /mnt/windowsnfs.
5. Tested by placing a file from both ends into the directory and touching it from the other end.

## Configuring NFS Server and client on Windows Server 2019

NFS Server needed to be installed on the Windows server to share a file to the two Ubuntu machines.

1. Opened Server Manager and navigated to *Manage | Add Roles and Features* and selected *Files and Storage Devices | Server for NFS* as well as *Features | Client for NFS*.
2. Opened *Files and Storage | Shares | Tasks* and created a new quick NFS share on the C: drive named “nfs\_share”.
3. Right clicked on the share and navigated to permissions.
4. Gave ’10.19.3.36’ and ’10.19.2.36’ read and write permissions for the share to allow for full file sharing through NFS.

## Configuring Samba on Windows Server 2019

Windows Server needed a Samba installation to be able to share a Samba file between the Windows machine and the two Linux computers.

1. Opened Server Manager and navigated to *Files and Storage Devices* *| Shares | Tasks* and created a new quick SMB share on the C: drive named “samba\_share”.
2. Right clicked on the share and opened permissions and allowed ‘everyone’ full control of the share to allow for full file sharing.

## Samba Configurations on Alma

Samba needed to be configured on the Alma to receive a samba share from the Windows as well as share a samba share to the other machines.

1. Installed Samba with sudo yum install samba.
2. Enabled Samba service with systemctl enable smb nmb.
3. Created a user to authenticate to use samba with adduser -M sambauser -s /sbin/nologin.
4. Created a password for the user with smbpasswd -a sambauser.
5. Used chown nobody:nobody smb\_share to give the SMB share group assignment.
6. Opened the Samba conf file (/etc/samba/smb.conf) with *nano* and added the following lines and then saved and closed the file:  
   [smb\_share]  
   path = /var/smb\_share  
   guest ok = yes  
   read only = no  
   directory mask = 0777  
   writable = yes  
   valid users = sambauser
7. Mounted the samba share to the ubuntu using sudo mount -t cifs -o ‘username=sambauser,password=[password]’ //10.19.3.36/smb\_share /mnt/ubtsamba
8. Mounted the samba share to the Windows machine using sudo mount -t cifs -o ‘username=Administrator,password=[password]’ //10.19.1.36/smb\_share1 /mnt/windowssamba.

## Samba Configurations on the Ubuntu Machine

Samba needed to be configured on the Ubuntu to receive a samba share from the Windows as well as share a samba share to the other machines.

1. Installed Samba using sudo apt install samba samba-common-bin.
2. Started the services with systemctl start smbd nmbd.
3. Enabled firewall access with sudo ufw allow samba.
4. Opened /etc/samba/smb.conf using *nano* and added the following lines:  
   [smb\_share]  
   path = /var/smb\_share  
   read only = no  
   wire list = sambauser  
   directory mask = 0777.  
   browseable = yes
5. Used chown nobody:nogroup smb\_share to give the SMB share group assignment.
6. Mounted the samba share to the Alma using:  
   sudo mount -t cifs -o username=sambauser //10.19.2.36/var/smb\_share /mnt/almasamba
7. Mounted the samba share to the Windows using:  
   sudo mount -t cifs -o username=administrator //10.19.1.36/smb\_share1 /mnt/windowssamba

## Shutting Down all Non-Required Network Services on Alma

It was important to shut down all non-required services to prevent as many vulnerabilities in the system as possible.

1. Used netstat -atupto check running network services.
2. Used kill -9‘PID’ to turn off all services that were not necessary.

## Shutting Down all Non-Required Network Services on Ubuntu

It was important to shut down all non-required services to prevent as many vulnerabilities in the system as possible.

1. Used sockstat -I | less to check running network services.
2. Used kill -9 ‘PID’ to turn off all services that were not necessary.

## Process Accounting Implementation on Almalinux

Process accounting was important to implement because it is helpful to see all commands that users are running on the system.

1. Used sudo yum install to install process accounting.
2. Used systemctl start psacct to start the service.
3. Used service psacct start to ensure the service is enabled.
4. Typed chkconfig psacct *on* to start the service at boot time.
5. Viewed logs in /var/account/pacct.
6. Used ac to get the connection time statistics of the user.
7. Used lastcomm to see the last commands users have used.

## Process Accounting Implementation in Ubuntu

Process accounting was important to implement because it is helpful to see all commands that users are running on the system.

1. Typed sudo apt-get install acct to install process accounting.
2. Used acto get the connection time statistics of the user.
3. Viewed logs in /var/log/account/pacct.
4. Used lastcomm to see the last commands users have used.

## SELinux Centos Enable

SELinux needed to be enforced to inherently secure the system. This was done through modifying a config file and a command.

1. Used sudo nano /etc/selinux/configto open the SELinux config file.
2. Set the line “SELINUX=disabled” to *enabled*.
3. Saved and closed the config file.
4. Turned on enforcing mode with sudo setenforce 1.

## X-Windows Implementation on Windows

Windows needed to have X-Windows installed so that it could forward the graphics to the UNIX machines.

1. Downloaded and installed Xming from the internet.
2. Downloaded and installed PuTTY from the internet.
3. Turned on X11 allow in the SSH PuTTY settings.
4. Launched Xming from the Windows search menu.
5. SSHd into each Linux machine and used startx or xinit.

## X-Windows Ubuntu Configuration

Ubuntu needed to have X-Windows installed as well as all compatible packages to allow Windows Server 2019 machines to forward it applications for a GUI.

1. Used sudo apt-get install xorg to install xorg.
2. Usedsudo apt-get install openbox to install openbox.
3. Typed sudo apt-get install xerver-xorg to install xserver.
4. Entered sudo apt purge xorg “xserver-\*” to purge xserver.
5. Entered sudo apt purge lightdm Plymouth to purge lightdm.
6. Typed sudo rm -rf /etc/X11/xorg to remove the xorg file.
7. Entered sudo apt autoremove to autoremove dependencies.
8. Used sudo apt install {xserver-xorg, xorg, openbox} to reinstall all packages.
9. Typed startx to enter the X-Server application.

## X-Windows Alma Configuration

Ubuntu needed to have X-Windows installed as well as all compatible packages to allow Windows Server 2019 machines to forward it applications for a GUI.

1. Installed all necessary X-Windows with the following commands:  
   yum install xorg-\*  
   yum install xterm
2. Installed dnf with yum install dnf-plugins-core.
3. Enabled PowerTools with yum config-manager –set-enabled crb.
4. Typed Sudo yum install firefox to download something to run on Alma.
5. Used xinit to start X-Windows.

# APPENDICES

## Appendix A: Differences Between Alma and Ubuntu

Similarities between the operating systems:

* The process for installing OpenSSH and SCP was the exact same.
* The flag of -X was the same when starting X-Windows sessions.
* The process for mounting filesystems were the same across systems.
* The process of modifying Samba configuration files were the same across the systems.
* Shutting down all non-required network services used the same command to kill.
* Setting all file permissions were the same across operating systems.

Differences between the operating systems:

* There were different entries needed for the /etc/exports file for NFS.
* There were different groups that existed for NFS share ownership.
* Alma Linux and Ubuntu have different processes for mounting shares.
* Ubuntu and Alma Linux have different processes for firewalls.
* Ubuntu and Alma Linux have different ways of authenticating users for Samba share usage.
* Both Linux operating systems had different ways of viewing network statistics.
* There were more commands needed to configure property accounting.
* SELinux was only necessary to be installed on Alma Linux.
* X-Windows installation only required the server package installed on Alma, where the Ubuntu machine needed some files removed as well as many different packages.
* There were different commands used to initiate X-Windows sessions.

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