

## Project 3 Linux Project

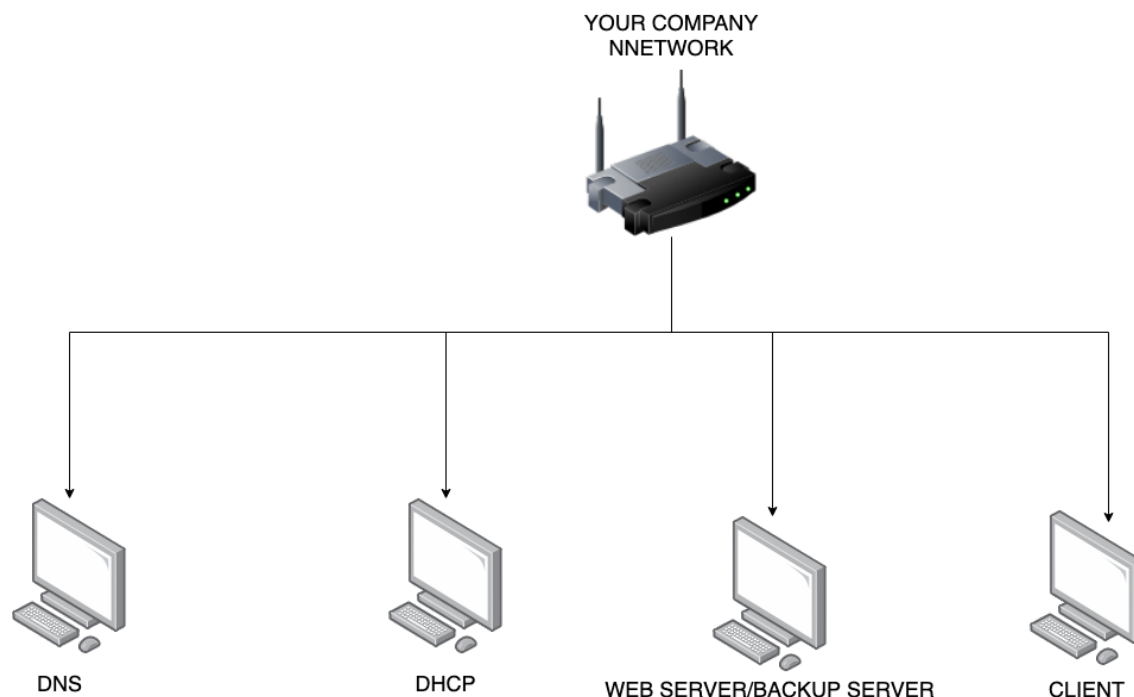
**Marks: 150 + 20 (Bonus) = 170**

**DUE: 21<sup>st</sup> March 2020 (Friday)**

Now that you are well versed with various protocols, you are ready to take up this big undertaking: act as the network engineer for your company! A good engineer comes up with a solution considering all factors that are required for the project.

Your goal is to come up with the best possible solution that is robust, secure, dynamic and intelligent for the given scenario.

Discuss requirements with your team and come up with a design that is feasible taking into account the problem statement, resources and the deadline. Once approved by all team members, implement the elements of the project individually and finally, integrate the elements to complete the solution. The architecture of the project looks like this:



**\*YOUR ARCHITECTURE MAY LOOK DIFFERENT; THIS IS ONLY A SPECIFIC INSTANCE**

The tasks and their corresponding requirements are given below

## 1. DNS

Your first task is to build a DNS implementation for a start-up company in the city of Boston. As the engineer, you're expected to implement a DNS server according to the specific requirements given below

Naming	Get a domain name of your choice for the start-up
Addressing	IPv4 and IPv6 address for your organization
DNS Servers	Configure name servers to handle queries for your domain
Documentation	Document the details for future users

### Guidelines

1. Assign a set of IPs (IPv4 and IPv6) that must be used for this project
2. You may use one of the following DNS servers: BIND, Posadis, PowerDNS
3. Create any 5 DNS records
4. Use IPv4 and IPv6 addresses in your implementation of records
5. Create reverse domain records `addr.arpa` and `ipv6.arpa` for the addresses you are using
6. Configure a Master DNS server as well as a Slave DNS server, the Slave DNS should automatically update with Master DNS server
7. Show the testing, along with the test plan and provide example of your implementation
8. When you work/design your project remember that you must give a demo. Plan accordingly

## 2. DHCP

The next task is to build a DHCP implementation your company. As the engineer, you're expected to implement a DNS server according to the specific requirements given below

Scope	A full range of IP addresses that can be leased from a DHCP server.
Address Pool	The IP addresses in a scope that are available for lease.
Exclusion Range	Address in the scope that are excluded from leasing. Excluded addresses are normally used to give hardware devices, such as routers, a static IP address.
Reservation	A means for assigning a permanent IP address to a client, server, or hardware device. Reservations are typically made for servers or hardware devices that need a static IP address.

Lease	The amount of time that a client may use an IP address before the client must re... lease the IP address or request another one.
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#### **Guidelines**

1. Assign IPv4 and IPv6 (unicast local) addresses to users dynamically as they enter your company network
2. Show reserved IP addresses for particular machines
3. You may use ISC-DHCP or other DHCP server of your choice
4. Show the testing, mention the test plan and provide example of your implementation
5. When you work/design your project remember that you must give a demo. Plan accordingly

### **3. WEB SERVER & FIREWALL**

Configure a web server for your company and secure it from external attacks. You must be able to access the webserver using the domain name, IPv4 address and IPv6 address. How can this be practically implemented in your Linux machine? What do you think is the simplest way to secure your network from external networks attacks? Considering that you don't have much funding to buy more security devices, how do you think you can secure your server? There are different ways by which we can secure a server for the above scenario. For example, it can be IP filtering, protocol filtering, etc. Make your network as much secure as possible.

#### **Guidelines**

1. Use only command line tools and packages
2. Provide all the commands that you have used and give a brief description in one line
3. Provide the changes you have made to the files/folders for configuring the webserver as well as the firewall. Also, create a basic web page to be served by this web server.
4. Make this page accessible to the clients in your network using a web browser
5. Make your server the most secured one in all possible ways
6. Show the testing, mention the test plan and provide example of your implementation
7. When you work/design your project, remember that you must give a demo. Plan accordingly.

### **4. BACKUP**

Isn't it always better to design a robust system? When there is a group of people working on a server, there is a possibility that the server might crash because of increase in usage or because of the heavy- duty processes running on the servers. The best way is to systematically create a backup of every day's work from the current

server to a different server. Your task is to create a backup server that fulfills the following requirements:

1. Automate the process of backing up the data such that it backs up periodically with a unique timestamp to indicate the latest update
2. The backup file should be zipped and sent to a different server
3. Describe briefly about how you backup automatically and how file transfer is made
4. Also provide the commands and configurations for sending the zipped file to a different location
5. Mention which protocol you are using to complete this task
6. Show the testing, mention the test plan and provide example of your implementation
7. When you work/design your project remember that you must give a demo. Plan accordingly

**\*\*\*You have the liberty to improvise and implement in different ways and with different tools but make sure it covers the requirement.**

### **Add-on: (Bonus Points)**

**20 Marks**

#### **1. ARP SPOOFING**

The Address Resolution Protocol (ARP) is a telecommunication protocol used for resolution of Internet layer addresses into link layer addresses, a critical function in computer networks.

To earn these bonus points, you must implement a malicious user in your network which hosts its own webserver. This malicious user is going to poison the ARP entry for original web-server in the client's ARP cache and once client sends a request to the IP address of the original webserver, the request will be received by the malicious user and user will see a Hacked Web-Page. You may use Ettercap, Bettercap or any other tool of your choice.

#### **2. IPSec VPN TUNNEL**

Implement IPSec VPN tunnels between two linux machines using openswan or strongswan or any other tool of your choice

#### **3. NFS**

Implement NFS. There should be at least 2 clients (can be VMs on which other servers are hosted) to whom the shared file would be available

## **Project Report**

Report should include your detailed work and methodology not limiting to the following

1. Behavior of the protocol
2. Signaling
3. Hierarchy
4. Commands used
5. Algorithm & Flow Chart
6. Testing
7. Working with an example (Integration)
8. Provide screenshots of various packets involved in each of your protocol using Wireshark
9. Future improvements

## Project Demo

1. Every group will be responsible for preparing themselves for a demo and explaining the details of the project.
2. Demonstrate the functionality of each protocol and integration of all the parts mentioned above.
3. **Summary of the Demo:** The DHCP server should be able to lease IP to clients; the client should be able to access the web page hosted by the web browser by resolving its IP from the DNS, and later the Firewall should be able to block the client; the client must also be able to receive backup files from the backup server.