Guided Practice: Configure Services- DHCP

Outcome

In this Guided Practice, you will write an Ansible playbook to configure DHCP on the Ubuntu computer. Then, you'll configure one of the Windows network adapters to receive its IP Address, Subnet Mask, Default Gateway, and Preferred DNS Server from your Ubuntu DHCP Server.

Resources Needed

- VCASTLE Pod configured for the class. For this Guided Practice, we use the CentOS 8, Ubuntu 20.04 LTS and Windows 2019 Server.
- Your user needs to be able to elevate their privileges with sudo.

Level of Difficulty

Moderate

Deliverables

Deliverables are marked in red font or with a red picture border around the screenshot. Additionally, there are questions at the end. **Your username or studentid should be visible in all screenshots that you submit.**

General Considerations

Ansible should already be installed on your CentOS machine from a prior Guided Practice.

Configuring an Ansible Playbook to Deploy DHCP to Ubuntu

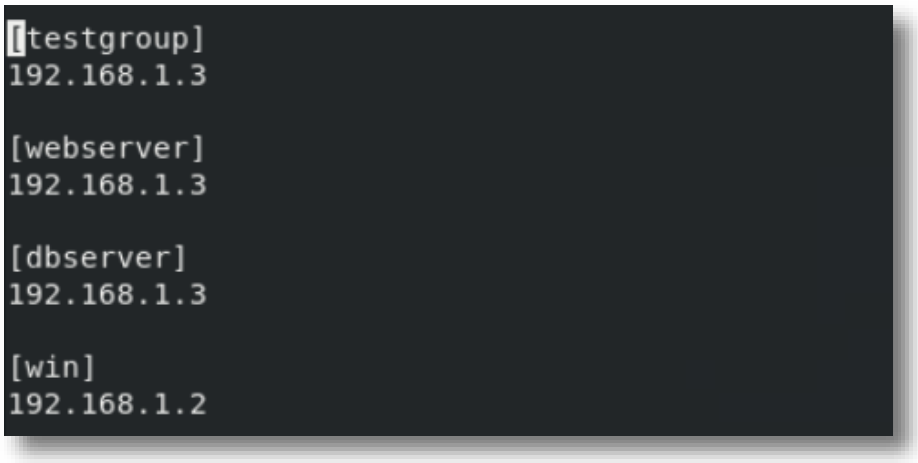
DHCP stands for Dynamic Host Configuration Protocol. A DHCP Server provides IP information to hosts requesting it. Minimally, an IP Address and Subnet Mask are required. In the Guided Practice, we'll also configure a Default Gateway and Preferred DNS Server.

1. First, let's check the Ansible hosts file, and make sure that your Ubuntu computer's IP Address is assigned to one of the groups. In our example here, the Ubuntu's IP Address, 192.168.1.3, is assigned to testgroup.

   a. Log onto the CentOS computer using the user you created with your studentID.
   b. Open the Ansible hosts file by typing:

   ```
   nano /etc/ansible/hosts
   ```

   You should see that the Ubuntu computer's IP Address is in one of the groupings.

   c. Now, we're going to write a playbook with five tasks, all of which will be target the Ubuntu computer:
      - Install isc-dhcp-server (The DHCP Service for Ubuntu).
      - Copy a file with subnet information from CentOS to Ubuntu.
      - Change permissions on the dhcpd.conf file (the DHCP configuration file on Ubuntu).
      - Append data to dhcpd.conf that will create the subnet from which you'll have a pool of IP Addresses to assign.
      - Start the DHCP service on Ubuntu.

      Start by creating a new file called dhcp.yml with your text editor. If you're using **nano**, type:

      ```
      sudo nano dhcp.yml
      ```

2. The first of the five tasks involves downloading the dhcp server service to the target (Ubuntu) computer. You'll need to know the name of the group in the hosts file that contains your Ubuntu computer's IP Address. In this case, the name is **testgroup**.

The following playbook, which we begin below, will run on testgroup. You'll become the sudo user, and it will use apt to install the isc-dhcp-server, which is the name of the server service you want to run on Ubuntu.

```
---
-  hosts: testgroup
   become: true
   tasks:
    -  name: install isc-dhcp-server
       apt: name=isc-dhcp-server
```

3. Now, we'll add a second task. Since dhcp requires a **dhcpd.conf** file, we'll add our own subnet information to it. The **dhcpd.conf** file is created when dhcp is installed, and it contains samples of subnet configurations. We're going to write our own subnet information shortly. This information will reside in a file in the same directory as the Ansible playbook and will be copied to Ubuntu when the playbook runs. For now, we'll just refer to the file, which we'll call **dhcp.conf.subnet**. The next task copies the **dhcp.conf.subnet** file to Ubuntu in the same directory as the "real" **dhcpd.conf** file.

   Add the second task to your playbook, so it resembles this:

```
---
-  hosts: testgroup
   become: true
   tasks:
     - name: install isc-dhcp-server
       apt: name=isc-dhcp-server
     - name: copy subnet information to target
       template:
         src: dhcp.conf.subnet
         dest: /etc/dhcp/dhcp.conf.subnet
         mode: 0444
```

   Let's consider what's going on in the second task. We're copying a file called **dhcp.conf.subnet** from your local CentOS machine to the destination **/etc/dhcp/dhcp.conf.subnet**, which is on your Ubuntu machine, and assigning permissions.

   Save your playbook. If using nano, type:

```
Ctrl+O and Ctrl+X
```

4. Stop and check your Ansible syntax. Type this at the command line:

```
ansible-playbook dhcp.yml --syntax-check
```

Your output should resemble this. If not, please correct any syntax errors, take a screenshot, and paste it into your lab report.

```
[ranbel1234@cis321-centos ~]$ ansible-playbook dhcp.yml --syntax-check

playbook: dhcp.yml
[ranbel1234@cis321-centos ~]$
```

Take a screenshot like the one above for your Lab Report.

5. The next task is to change permissions on the **dhcpd.conf** file, which will already exist on Ubuntu, and which we need to append. This task gives read and write permissions on the **dhcpd.conf** file:

```
- name: change permissions on dhcpd.conf
  file:
    path: /etc/dhcp/dhcpd.conf
    mode: 0666
```

6. Next, we'll take the text from the file we're about the create and append that text to the **dhcpd.conf** file. This file contains relevant information about the subnet on which our DHCP server will assign IP information. We'll write the file on the CentOS machine and copy it to Ubuntu in the same directory as the dhcpd.conf file. The shell module allows us to use the Linux cat command. The double arrows (>>) append the output of the cat command to the existing **dhcpd.conf** file.

```
- name: append subnet to dhcpd.conf file
  shell: cat /etc/dhcp/dhcp.conf.subnet >> /etc/dhcp/dhcpd.conf
```

7. The last task in the playbook is to start **dhcp** on the target. You should type this in the **dhcp.yml** file:

```
- name: start dhcp
  systemd:
    state: started
    name: isc-dhcp-server
```

8. The file should resemble the one below.

```
---
- hosts: testgroup
  become: true
  tasks:
    - name: install isc-dhcp-server
      apt: name=isc-dhcp-server
    - name: copy subnet information to target
      template:
        src: dhcp.conf.subnet
        dest: /etc/dhcp/dhcp.conf.subnet
        mode: 0444
    - name: change permissions on dhcpd.conf
      file:
        path: /etc/dhcp/dhcpd.conf
        mode: 0666
    - name: append subnet to dhcpd.conf file
      shell: cat /etc/dhcp/dhcp.conf.subnet >> /etc/dhcp/dhcpd.conf
    - name: start dhcp
      systemd:
        state: started
        name: isc-dhcp-server
```

Take a screenshot like the one above for your Lab Report.

9. Save your work, and exit the text editor. If you're using nano, type:

```
Ctrl+O and Ctrl+X
```

10. Check your syntax again, and correct any errors. Type:

```
ansible-playbook dhcp.yml --syntax-check
```

11. We still have to write the text file that will contain information for our dhcpd.conf file. Here are the parameters:
    a. We'll use the 192.168.1.0/24 subnet – the same subnet all three of our machines are on.
    b. Along with the IP Address and subnet, we'll assign our DHCP clients a Default Gateway of 192.168.1.1, and a Preferred DNS Server of 8.8.8.8.

c. For test purposes, we'll restrict our pool of assignable IP address to 192.168.1.14 through 192.168.1.16. By doing this, it simplifies verification of our DHCP client.
d. We want one of the Ubuntu network adapters used. In this case, it's "ens160." Please check your machine and use the Internal interface.
e. Using your text editor, create a file called **dhcp.conf.subnet**, and enter this information. The pound signs (#) are comments. Before saving the file, take a screenshot for your lab report.

```
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.8                    dhcp.conf.subnet

#Interface
INTERFACESv4="ens160";
# Subnet declaration
subnet 192.168.1.0 netmask 255.255.255.0 {
range 192.168.1.14 192.168.1.16;
option routers 192.168.1.1;
option domain-name-servers 8.8.8.8;
}
```

Take a screenshot like the one above for your Lab Report.

12. Based on the way the playbook is written, the **dhcp.conf.subnet** file should be in the same directory as your playbook. Run the playbook:

```
ansible-playbook dhcp.yml --ask-become
```

You should receive a password prompt, and, if successful, your output should resemble this.

```
[ranbel1234@cis321-centos ~]$ ansible-playbook dhcp.yml --ask-become
BECOME password:

PLAY [testgroup] ***************************************************************

TASK [Gathering Facts] *********************************************************
ok: [192.168.1.3]

TASK [install isc-dhcp-server] *************************************************
changed: [192.168.1.3]

TASK [copy subnet information to target] ***************************************
changed: [192.168.1.3]

TASK [change permissions on dhcpd.conf] ****************************************
changed: [192.168.1.3]

TASK [append subnet to dhcp.conf file] *****************************************
changed: [192.168.1.3]

TASK [start dhcp] **************************************************************
changed: [192.168.1.3]

PLAY RECAP *********************************************************************
192.168.1.3                : ok=6    changed=5    unreachable=0    failed=0    skip
ped=0    rescued=0    ignored=0
```

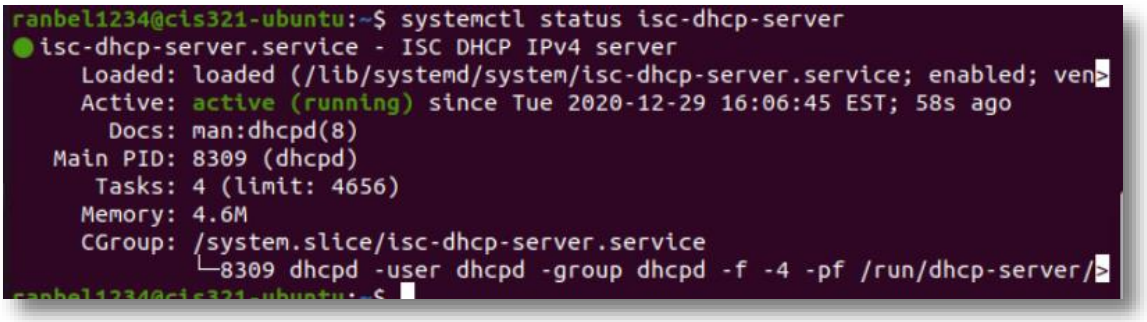
Take a screenshot like the one above for your Lab Report.

13. At this point, we need to check the Ubuntu computer the ensure that DHCP is running, and then we'll have your Windows computer receive an IP Address from it.

    Log onto Ubuntu, and type:

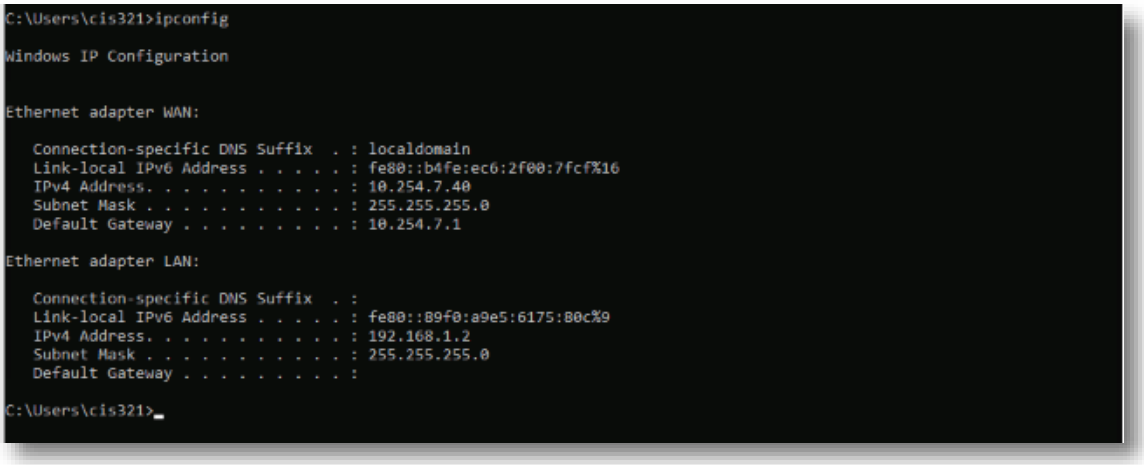
```
systemctl status isc-dhcp-server
```

    Your output should look like this:

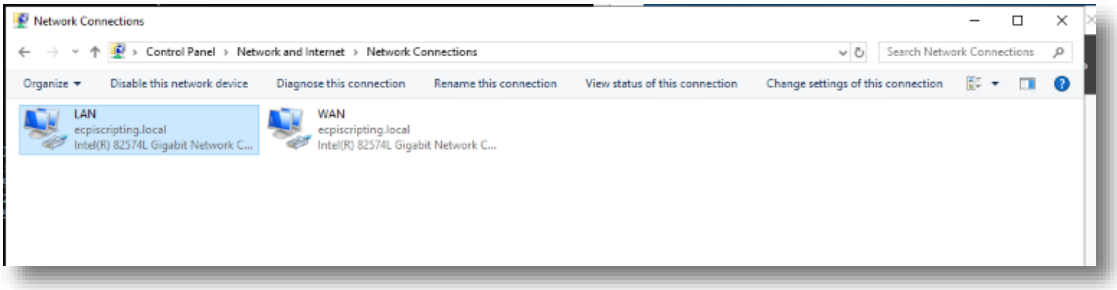


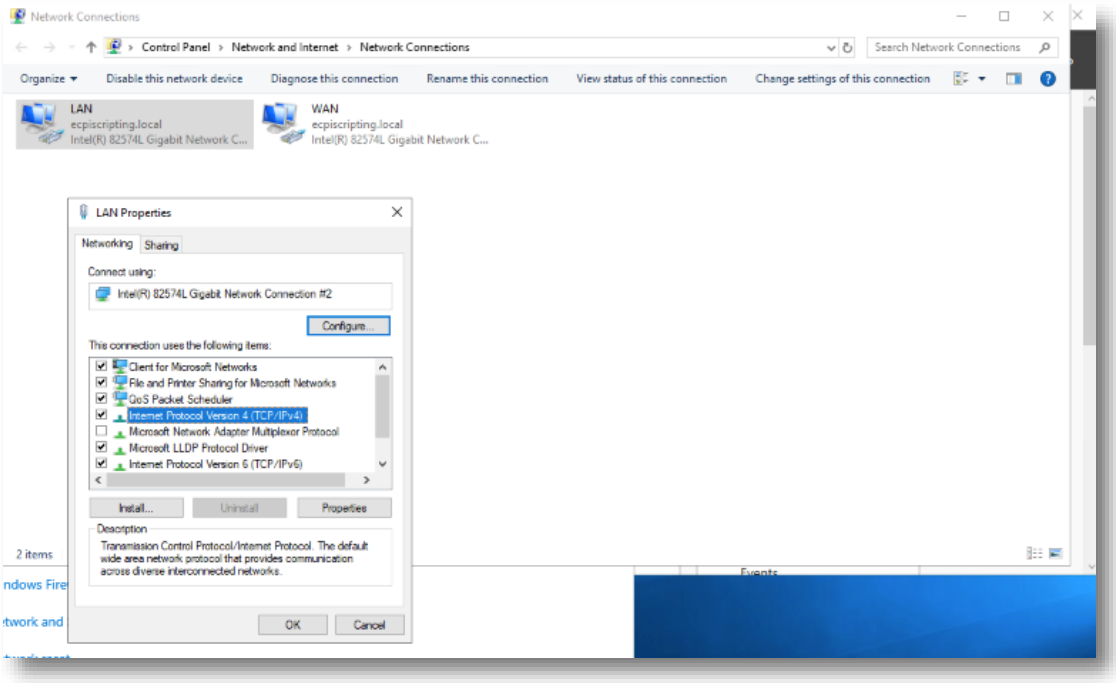
14. Log onto the Windows computer, open a command window, and run **ipconfig**.

    Notice the computer has two network adapters, and "Ethernet adapter LAN" has an IP Address of 192.168.1.2. Our objective is to reconfigure that network adapter so it receives its IP Address dynamically from our Ubuntu DHCP server.

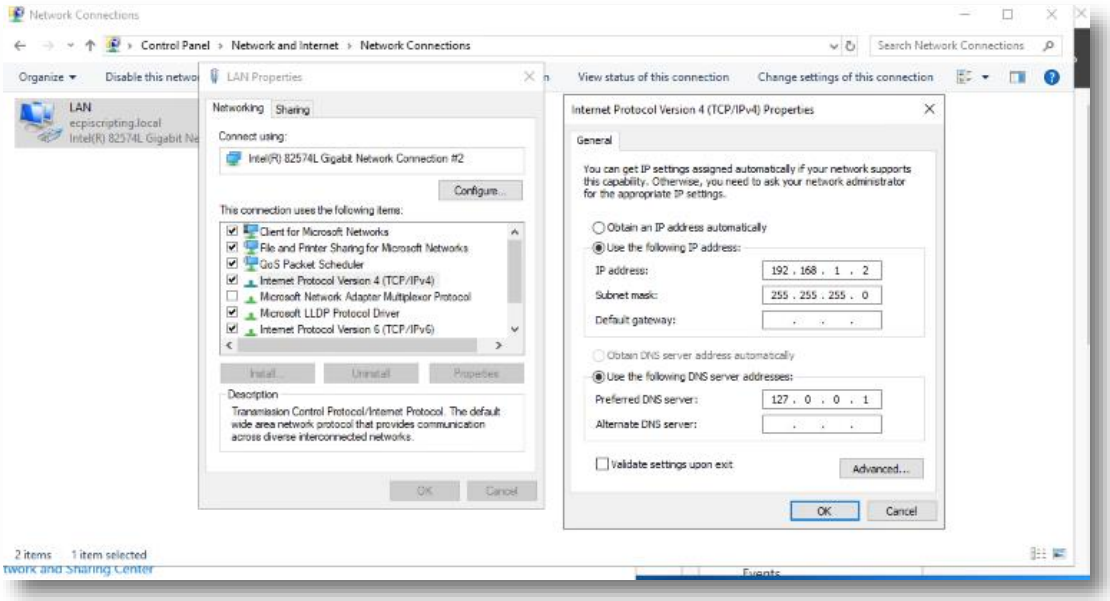


15. Right-click on the **Start** button, go to **Network Connections**, click **Network and Sharing Center**, select **LAN**, select **Properties**, and highlight **Internet Protocol Version 4 (TCP/IPv4).** Click the **Properties** button.

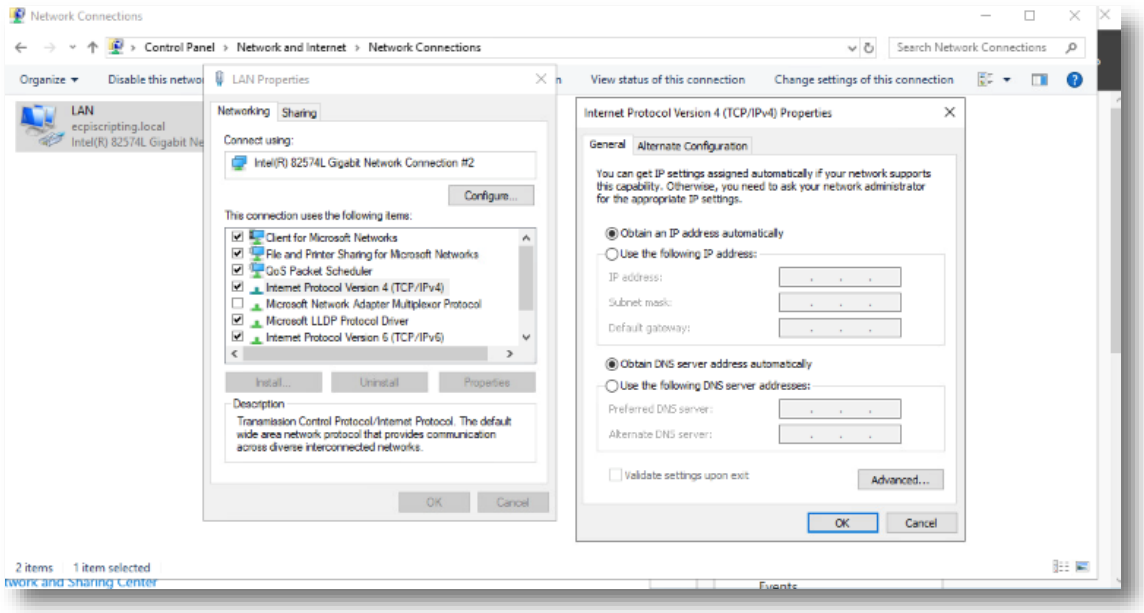




Notice the IP Address has been statically set. And the Preferred DNS Server is 127.0.0.1 – the localhost.



16. Click the button that says **Obtain an IP address automatically**, and the button that says **Obtain DNS server address automatically.**

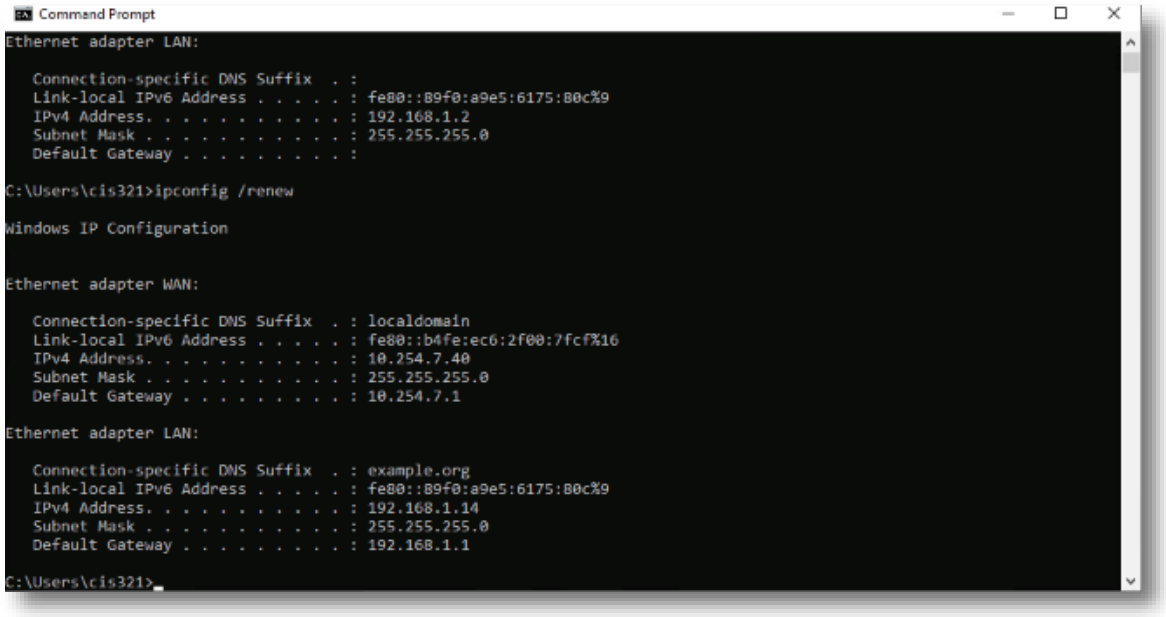


Click **OK** and then **Close**.

17. In the Windows command window, type:

```
ipconfig /renew
```

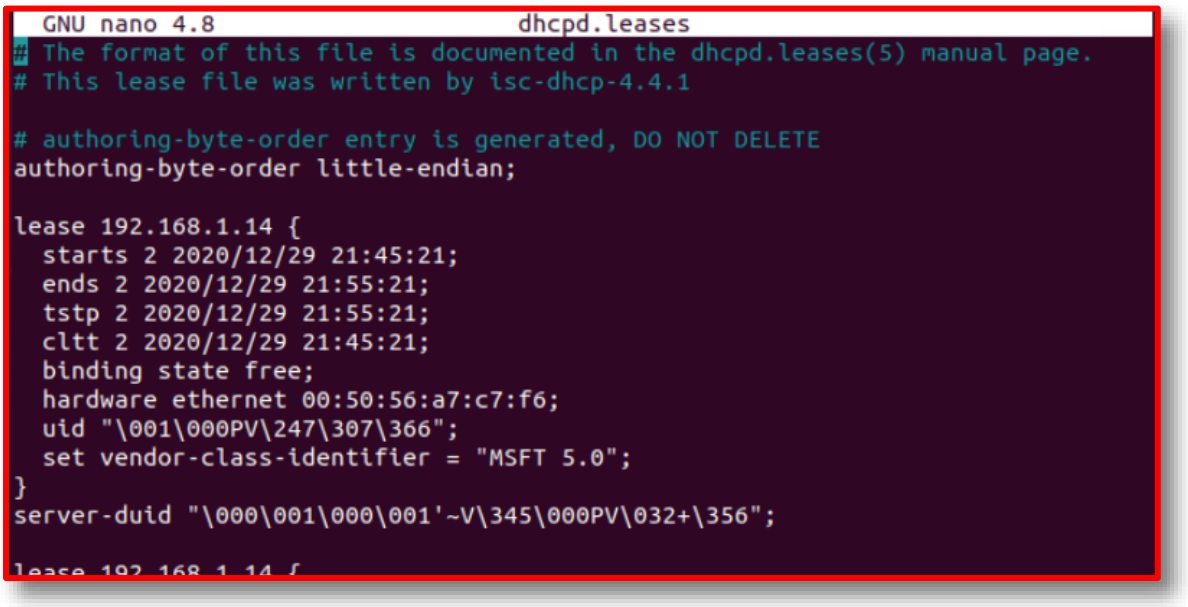
It may take a moment. The LAN adapter will receive the IP Address 192.168.1.14, which is the first IP Address in the range of IP Addresses that your DHCP server has to offer. Your command window should resemble this:



18. To confirm, log back onto the Ubuntu computer and open the file containing the leases – that is, the list of IP Addresses assigned by your DHCP server.

```
nano /var/lib/dhcp/dhcpd.leases
```

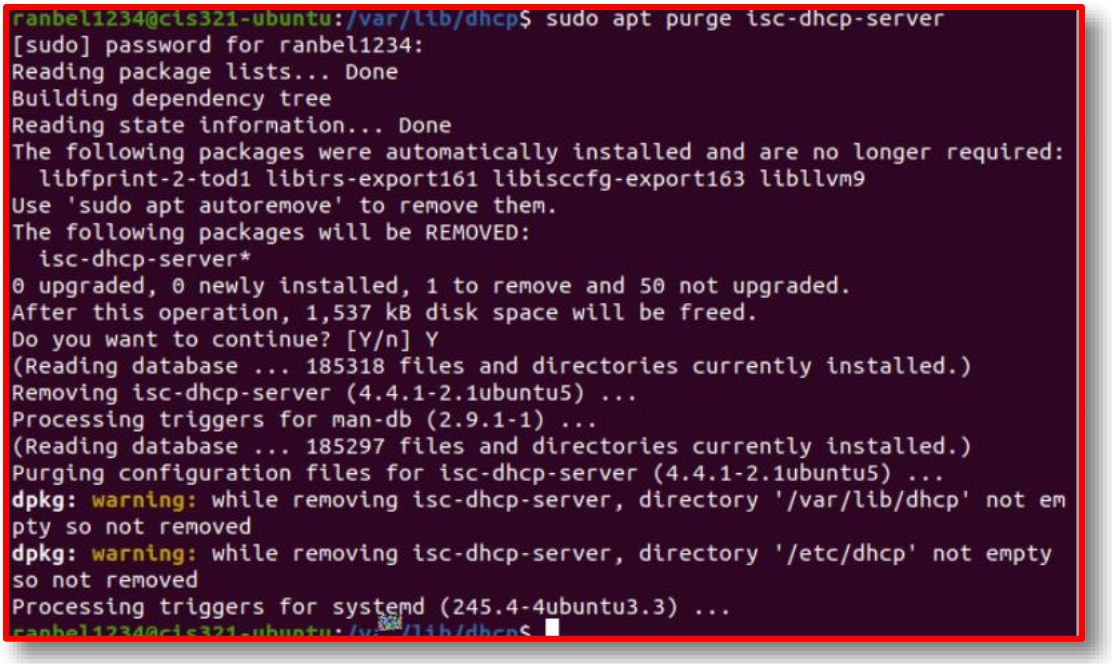
Your output should resemble this. Notice the file lists the IP address, the hardware address of the DHCP client, and the start and end time.



Take a screenshot like the one above for your Lab Report.

19. Now, before proceeding with any other Guided Practices or Performance Assessments, you need to:
    a. Retrace your steps in Windows, so that the LAN adapter's IP Address is set back to 192.168.1.2, the Subnet Mask is 255.255.255.0, and the Preferred DNS Server is 127.0.0.1. **Make sure you run ipconfig to confirm**.
    b. On Ubuntu, you need to remove DHCP. In a terminal window, type:

```
sudo apt purge isc-dhcp-server
```



Take a screenshot like the one above for your Lab Report.

20. Notice the related dhcp folders weren't empty and weren't removed. Remove them now manually.

```
sudo rm -r /etc/dhcp
sudo rm -r /var/lib/dhcp
```

Guided Practice Questions

In your **Guided Practice Lab Report**, in addition to the screenshots, include answers for the following questions about this learning activity. Some may require research.

1. What is a subnet?
2. What is meant by an address pool?
3. The minimum IP configuration requires an IP Address and a Subnet Mask. What is a Subnet Mask?
4. What does the dhcpd.leases file contain?
5. In the Ansible playbook, explain the following syntax:

```
shell: cat /etc/dhcp/dhcp.conf.subnet >> /etc/dhcp/dhcpd.conf
```