3. Student Activity

Student Activity: Practicing Subnetting and DHCP

Welcome to the hands-on activity session! Now that you've learned about subnetting and DHCP, it's time to put that knowledge into practice. This activity will guide you through exercises to reinforce your understanding of these concepts. Let's get started!

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1. Subnetting Practice

Example 1: Subnetting a Class C Network

Task: Divide the network `192.168.10.0/24` into two equal subnets.

1. **Identify the Subnet Mask**: The original subnet mask is `255.255.255.0` (/24).
2. **Determine the New Subnet Mask**: To create two subnets, borrow 1 bit from the host part. The new subnet mask is `255.255.255.128` (/25).
3. **Calculate the Subnets**:
   - Subnet 1: `192.168.10.0/25` (Hosts: 192.168.10.1 to 192.168.10.126)
   - Subnet 2: `192.168.10.128/25` (Hosts: 192.168.10.129 to 192.168.10.254)

Example 2: Subnetting a Class B Network

Task: Divide the network `172.16.0.0/16` into four subnets.

1. **Identify the Subnet Mask**: The original subnet mask is `255.255.0.0` (/16).
2. **Determine the New Subnet Mask**: To create four subnets, borrow 2 bits from the host part. The new subnet mask is `255.255.192.0` (/18).
3. **Calculate the Subnets**:
   - Subnet 1: `172.16.0.0/18` (Hosts: 172.16.0.1 to 172.16.63.254)
   - Subnet 2: `172.16.64.0/18` (Hosts: 172.16.64.1 to 172.16.127.254)
   - Subnet 3: `172.16.128.0/18` (Hosts: 172.16.128.1 to 172.16.191.254)
   - Subnet 4: `172.16.192.0/18` (Hosts: 172.16.192.1 to 172.16.255.254)

Example 3: Subnetting a Class A Network

Task: Divide the network `10.0.0.0/8` into eight subnets.

1. **Identify the Subnet Mask**: The original subnet mask is `255.0.0.0` (/8).
2. **Determine the New Subnet Mask**: To create eight subnets, borrow 3 bits from the host part. The new subnet mask is `255.224.0.0` (/11).
3. **Calculate the Subnets**:
   - Subnet 1: `10.0.0.0/11` (Hosts: 10.0.0.1 to 10.31.255.254)
   - Subnet 2: `10.32.0.0/11` (Hosts: 10.32.0.1 to 10.63.255.254)
   - Subnet 3: `10.64.0.0/11` (Hosts: 10.64.0.1 to 10.95.255.254)
   - Subnet 4: `10.96.0.0/11` (Hosts: 10.96.0.1 to 10.127.255.254)
   - Subnet 5: `10.128.0.0/11` (Hosts: 10.128.0.1 to 10.159.255.254)
   - Subnet 6: `10.160.0.0/11` (Hosts: 10.160.0.1 to 10.191.255.254)
   - Subnet 7: `10.192.0.0/11` (Hosts: 10.192.0.1 to 10.223.255.254)
   - Subnet 8: `10.224.0.0/11` (Hosts: 10.224.0.1 to 10.255.255.254)

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2. DHCP Practice

Example 1: Setting Up a DHCP Server

Task: Configure a DHCP server to assign IP addresses in the range `192.168.1.100` to `192.168.1.150`.

1. **Set Up the DHCP Server**: Use a router or a dedicated server with DHCP capabilities.
2. **Define the IP Address Pool**: Configure the server to assign addresses from `192.168.1.100` to `192.168.1.150`.
3. **Set the Lease Time**: Configure a lease time of 24 hours (86400 seconds).

Example 2: Configuring Additional DHCP Options

Task: Configure the DHCP server to provide additional settings like the default gateway and DNS server.

1. **Default Gateway**: Set the default gateway to `192.168.1.1`.
2. **DNS Server**: Set the DNS server to `8.8.8.8` (Google's public DNS).
3. **Verify Configuration**: Connect a device to the network and check if it receives the correct IP address, gateway, and DNS settings.

Example 3: Troubleshooting DHCP Issues

Task: Identify and resolve a common DHCP issue where a device is not receiving an IP address.

1. **Check DHCP Server Status**: Ensure the DHCP server is running and has available IP addresses in the pool.
2. **Verify Network Connection**: Check if the device is properly connected to the network.
3. **Renew IP Address**: On the client device, use the command `ipconfig /renew` (Windows) or `dhclient` (Linux) to request a new IP address.
4. **Check for IP Conflicts**: Ensure no other device is using the same IP address.

Conclusion

By completing these exercises, you should have a better understanding of how subnetting and DHCP work in practice. Remember, subnetting helps organize and manage networks efficiently, while DHCP automates the process of assigning IP addresses to devices. Practice these steps regularly to reinforce your learning and build confidence in your networking skills. If you have any questions or need further assistance, feel free to ask!