3. Student Activity

Student Activities: DNS (Domain Name System) in Networking Essentials

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Activity 1: DNS Query using nslookup

Objective: Understand how to perform a basic DNS query to find the IP address associated with a domain name.

Steps:

1. Open the command prompt (Windows) or terminal (Linux/Mac).
2. Type the command `nslookup www.google.com`.
3. Observe the output and note the IP address returned by the DNS server.
4. Try querying other domains like `nslookup www.facebook.com` or `nslookup www.example.com`.
5. Answer the following questions:
   - What is the IP address of "www.google.com"?
   - How does the IP address differ when you query multiple domains?

Expected Outcome: You will see the domain's IP address and the DNS server that provided the answer.

Activity 2: Using dig to Analyze DNS Records

Objective: Use the `dig` command to explore the different DNS records associated with a domain name.

Steps:

1. Open the terminal (dig is typically available on Linux/Mac; you may need to install it on Windows).
2. Type `dig www.example.com` and observe the output.
3. Focus on the "ANSWER SECTION" to see details about the domain name's A record.
4. Modify the command to specifically query other DNS records:

- `dig www.example.com A` (for A record)
- `dig www.example.com MX` (for Mail Exchange record)
- `dig www.example.com CNAME` (for Canonical Name record)

5. Answer the following questions:
   - What is the IP address (A record) of "www.example.com"?
   - Is there an MX record for "www.example.com"? If so, what is it?
   - What CNAME record is associated with "www.example.com"?

Expected Outcome: You will retrieve specific DNS records like A, MX, and CNAME, which provide insights into the domain's setup.

Activity 3: Domain Ownership Check using whois

Objective: Learn how to check the registration details of a domain using the `whois` command.

Steps:

1. Open the command prompt or terminal.
2. Type `whois example.com` to retrieve information about the domain "example.com."
3. Look for key details such as the domain owner, registration date, expiration date, and registrar.
4. Try checking other domains such as `whois google.com` or `whois facebook.com`.
5. Answer the following questions:
   - Who is the registrar of "example.com"?
   - What is the expiration date of "example.com"?

Expected Outcome: You will receive detailed information about the domain's ownership, including registration and expiration dates, which are useful for understanding the lifecycle of domains.

Activity 4: Simulate DNS Resolution Process

Objective: Trace the DNS resolution process for a specific domain and understand how each step is completed.

Steps:

1. Open the terminal or command prompt.

2. Use the `dig +trace` command to trace the DNS resolution process for "example.com." Type `dig +trace www.example.com`.
3. Observe the step-by-step querying of root DNS servers, TLD servers, and authoritative servers.
4. Note the final IP address resolution.
5. Answer the following questions:
    - What are the root DNS servers involved in the query?
    - Which TLD server responded for ".com"?
    - What is the authoritative DNS server for "example.com"?

Expected Outcome: You will see the complete DNS resolution process from root servers to the authoritative server, helping you understand how a domain name is resolved to its IP address.

Activity 5: Configure DNS Records in a Test Domain (Optional for Advanced Students)

Objective: Set up a test domain and configure different DNS records (A, CNAME, MX).

Steps:

1. Register a test domain through any domain registration service (optional).
2. Access the DNS management console provided by the registrar.
3. Configure the following records for your domain:
    - A record: Point the domain to a web server’s IP address.
    - CNAME record: Set up an alias (like "www") to point to the main domain.
    - MX record: Direct email to a specific mail server.
4. Verify the DNS records by using `dig` or `nslookup` to query the configured domain.
5. Answer the following questions:
    - How long did it take for the DNS changes to propagate?
    - Can you verify the email server with the configured MX record?

Expected Outcome: You will configure and verify different DNS records, gaining hands-on experience with managing domain names and understanding how changes impact a domain.

These activities will give you practical experience with DNS tools, records, and processes, allowing you to troubleshoot and understand the functioning of DNS more effectively. Feel free to reach out to your trainer if you encounter any difficulties!

Student Activity: Practicing Application Layer Protocols

Welcome to the practical session on **Application Layer Protocols**! In this activity, you will get hands-on experience with some of the most common application layer protocols. Follow the steps below to practice and understand how these protocols work in real-world scenarios. Make sure you have access to a computer with internet connectivity to perform these exercises.

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1. HTTP/HTTPS (Hypertext Transfer Protocol / Secure)

Objective: Understand how HTTP and HTTPS work by interacting with web servers.

Example 1: Accessing a Website Using HTTP

- Open your web browser.
- Type `http://example.com` in the address bar and press Enter.
- Observe how the website loads using the HTTP protocol.

Example 2: Accessing a Website Using HTTPS

- In the same browser, type `https://example.com` and press Enter.
- Notice the padlock icon in the address bar, indicating a secure connection using HTTPS.

Example 3: Inspecting HTTP/HTTPS Requests

- Right-click on the webpage and select "Inspect" or "Inspect Element."
- Go to the "Network" tab.
- Refresh the page and observe the HTTP/HTTPS requests being made to the server.

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2. FTP (File Transfer Protocol)

Objective: Learn how to transfer files using FTP.

Example 1: Connecting to an FTP Server

- Download and install an FTP client like FileZilla.
- Open FileZilla and enter the following details:
  - Host: `ftp.example.com`
  - Username: `your_username`
  - Password: `your_password`
- Click "Quickconnect" to connect to the FTP server.

Example 2: Uploading a File

- In FileZilla, navigate to the local directory containing the file you want to upload.
- Drag and drop the file into the remote server directory.
- Observe the file transfer process in the status window.

Example 3: Downloading a File

- In FileZilla, navigate to the remote directory containing the file you want to download.
- Drag and drop the file into your local directory.
- Observe the file transfer process in the status window.

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3. SMTP (Simple Mail Transfer Protocol)

Objective: Understand how emails are sent using SMTP.

Example 1: Sending an Email Using a Web Client

- Open your email client (e.g., Gmail, Outlook).
- Compose a new email and send it to a recipient.
- Observe how the email is sent using SMTP.

Example 2: Configuring SMTP Settings

- In your email client, go to the settings or account configuration section.
- Locate the SMTP server settings and note the server address and port number.

Example 3: Sending an Email Using a Command-Line Tool

- Open a terminal or command prompt.
- Use a command-line tool like `sendmail` or `mail` to send an email.
- Example command: `echo "Subject: Test Email" | sendmail recipient@example.com`

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4. POP (Post Office Protocol) and IMAP (Internet Message Access Protocol)

Objective: Learn how emails are received using POP and IMAP.

Example 1: Configuring POP in an Email Client

- Open your email client and go to the account settings.
- Add a new account and select POP as the protocol.
- Enter the POP server details and complete the setup.

Example 2: Configuring IMAP in an Email Client

- Open your email client and go to the account settings.
- Add a new account and select IMAP as the protocol.
- Enter the IMAP server details and complete the setup.

Example 3: Comparing POP and IMAP

- Send an email to yourself and observe how it is received in both POP and IMAP configurations.
- Note the differences in how emails are stored and accessed.

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5. RDP (Remote Desktop Protocol)

Objective: Experience remote desktop access using RDP.

Example 1: Connecting to a Remote Computer Using RDP

- Open the Remote Desktop Connection application on your computer.
- Enter the IP address or hostname of the remote computer.
- Click "Connect" and enter your credentials to access the remote desktop.

Example 2: Transferring Files via RDP

- Once connected to the remote desktop, use the file explorer to transfer files between your local and remote computers.

Example 3: Configuring RDP Settings

- Open the Remote Desktop Connection application.
- Click on "Show Options" and explore the various settings available for display, local resources, and security.

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6. Telnet

Objective: Practice remote command-line access using Telnet.

Example 1: Connecting to a Remote Server Using Telnet

- Open a terminal or command prompt.
- Type `telnet example.com` and press Enter to connect to the remote server.

Example 2: Executing Commands via Telnet

- Once connected, execute basic commands like `ls` or `dir` to list files on the remote server.

Example 3: Understanding Telnet Security Limitations

- Research and note why Telnet is considered insecure and how SSH provides a secure alternative.

Conclusion

By completing these exercises, you should have a better understanding of how different application layer protocols work in practice. These hands-on activities will help reinforce the concepts discussed in the session and provide you with practical skills for working with network protocols. If you have any questions or need further assistance, feel free to ask!