HW 1: Networking Terminology

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1. Unix and VI are important for web programmers because web servers tend to run on UNIX-based systems. UNIX has influenced subsequent operating systems, making it one of the most important programming technologies ever created, and VI is a means to efficiently create scripts and text files within UNIX-based systems. As such, web programmers should be able to employ the use of UNIX commands to create web applications.

2. An SSH key provides the luxury of enhanced security during remote communication between two machines. This protocol allows for safe transfer, editing, and creating of files on a virtual machine without risk of attacks, as an SSH key has a client-side private key known only to a user. An SSH key also allows a user to connect to any machine in the UT computer lab with the same sign-on passcode.

3. Though the Open Systems Interconnection (OSI) and five-layer internet model share some similarities, they are also quite different. Both models have a physical, data link, network, and transport layer, which have the same functionality. The five-layer internet model has an application layer, which combines the functionality of the remaining three layers of the OSI model: the presentation layer, the session layer, and its application layer. The presentation layer maintains connections and controls ports and sessions; the presentation layer encrypts data and ensures data is in a usable format. The application layer allows applications to access network services.

4. A datagram is a self-contained unit of data transmitted over a network. It is made of a header, which has a 20-byte fixed part and a variable-length optional part, and a payload. There is an advantage of using User Datagram Protocol (UDP) over Transmission Control Protocol (TCP). While TCP is best used for stable connections with accurate data transmission, UDPs are best suited to real-time transmission of data, where accuracy is not prioritized.

5. Circuit switching uses dedicated circuits for each endpoint within a network. A good example of circuit switching is seen in telephone lines. The primary advantage of circuit switching is the ability to have a dedicated link, where no users can use it. This results in a reliable and guaranteed connection. One disadvantage of circuit switching is that a broken connection will render the network unusable until it is fixed. Another disadvantage is that the connection will become idle if the user does not use it. Packet switching splits data into small packets and transmits them through routers until they reach the target destination and are reassembled. The primary advantage of packet switching is that there is no equipment required for its use, so users can use resources as needed. They also don't need to worry about network failures, as a packet can take multiple routes to a destination. A disadvantage of packet switching is that network congestion can lead to the loss of data.

6. A token ring network was significantly more complex than an ethernet network. Token ring networks used a ring topology, using token passing to allow a station to use the network. Such a model was good for preventing collisions, but it was expensive and slower than ethernet networks. An ethernet network uses a bus topology and allows devices to compete for access to the network. They use repeaters (physical layer) to extend the length of the network; bridges (data link layer) to connect network segments and filter traffic; switches (data link layer) to create collision domains and prevent data collisions; and routers (network layer) to connect different networks and manage traffic between these networks.

7. The Apache Web Server uses HTTP protocol to accept directory requests from users and send a response in the form of web pages and files. It is also capable of using HTTPS protocol, but it does not do so by default. Whereas Apache is open source and available for most operating systems, IIS comes as a package with Windows and can only be used on Windows.

8. Simple Mail Transfer Protocol (SMTP) is an application involved with transferring emails to a designated recipient and is especially important for sending emails to recipients. Post Office Protocol (POP) is an application that copies messages onto a recipient's machine. It allows users to receive mail from a mail server. Internet Mail Access Protocol (IMAP) is an application that only copies a message header, which the what the viewer sees upon receipt. For IMAP to transfer the message body to the user, they must select the message.

9. MIME type specifications are useful for indicating the type of file of the data, which allows the browser to interpret and render the data. This includes images, videos, and non-ASCII text files.

10. There are multiple steps to an HTTP transaction. First, the user connects to a server with a URL through a browser; then, the browser sends an HTTP request to a server (using either a GET or POST method). The server receives the request and maps it to an IP address, and it generates a

response with a status code (which indicates whether it was a success or failure) and sends it to the client. Finally, the browser interprets the response and outputs the requested resource. When sending a request to a server, it uses either a GET or a POST method. The GET method sends data through the URL and is limited in character length. By contrast, the POST method is not limited in character length, as data is sent in the body of the request._