Review --- How is it going so far?

CHAPTER 1: WELCOME TO THE CLOUD

Why is the Internet usually depicted as a cloud?

It symbolizes that users should not have to know how it works, just as you do not have to know how the electrical system works when you turn on a light. The operation of the Internet should be hidden from them.

Is the Internet a single network? Explain.

The Internet is not a single network. It is a collection of single networks and smaller internets.

What is transcoding?

Changing a movie or other video into a form that can be delivered to consumers by Netflix or another streaming services.

How does Netflix use AWS?

For transcoding, selecting the best transcoded version for a particular user and set of network conditions, and personalized recommendations.

Distinguish between physical servers and virtual machines.

Physical servers are real computers. Virtual machines are parts of a server that act like computers but are not. A physical server may have many virtual machines. VMs can be quickly spun up, spun down, or moved to different physical servers.

Distinguish between IaaS CSPs and SaaS CSPs.

IaaSs provide VMs with operating systems but no application software.

SaaSs provide VMs complete with specific application software.

What are the advantages of using cloud application programs as a service, compared to traditional application purchasing?

- *It avoids large one-time expenses in buying software and replaces it with smaller monthly expenses to pay for the service. [PAY AS YOU GO!!]*

- *At least some of the management work is outsourced to the CSP.*

What is fragmentation? How does fragmentation improve error handling?

Dividing an (application) message into many smaller parts that will each be sent in a packet or frame. If there is a transmission error, only a single frame or packet is resent— not the entire applications message, which can be very long.

What are frames or packets?

They are small messages that carry application message segments. They travel across an internet (packet) or a single network (frame).

What is multiplexing? How does fragmentation reduce transmission cost through multiplexing?

Having the packets or frames of multiple users share a physical transmission line. Individual users do not have to pay for an entire line; they only pay for the capacity they use.

What are the three defining characteristics of single networks?

- *A single network uses a single technology for transmission. All devices must comply with that technology's standards.*

- *There is a controlled address space such that each host address is unique, like a telephone number.*

- *Messages in single networks are called frames, not packets.*

What decision do switches have to make when a frame arrives? How do they make this decision?

The switching decision: Where to send it next. Their switching table specifies where to send the frame next, based on the frame's destination address.

What is a route? Distinguish between a data link and a route.

A route is the path a packet takes through an internet from the source host to the destination host.

A data link is a path a frame takes through a single network.

Both single switched networks and routed networks are said to use packet switching. Why is this term confusing?

Packets are always routed.

Frames are always switched.

Packets are never switched.

CHAPTER 2: NETWORK STANDARDS

Describe the three-step handshake in TCP connection openings.

In the three-step handshake opening, Host A initiates communication with Host B by sending it a TCP SYN segment. When Host B receives the TCP SYN segment, it sends acknowledgement back to Host A. Host B does this by sending Host A a TCP SYN/ACK segment. When host A receives the TCP SYN/ACK segment from Host B, it sends back another acknowledgment that it received the acknowledgment segment. This acknowledgment is called a pure TCP ACK segment. And once this process is complete, a connection has been initiated between Host A and Host B.

Ethernet does error detection but not error correction. Is Ethernet a reliable protocol? Explain.

No. Reliability requires not only error detection, which Ethernet does, but also error correction, which Ethernet does not do.

What device in an Internet besides the destination host reads the destination IP address?

Routers read the destination IP addresses because they need to know where the packet is going in order to properly forward it in the right direction.

Is IP reliable or unreliable? Explain.

It is unreliable. It does error detection, but reliability also requires error correction.

Why was TCP designed to be complex?

TCP was designed to be complex so that it would be more reliable and do other things that the Internet Protocol does not do.

Why are sequence numbers good?

Sequence numbers are good because each segment has a sequence number which allows the receiver to confirm that there are no missing messages, ensures that all duplicate messages are deleted, and it helps to place segments in the correct order.

Is UDP reliable? Explain.

UDP is also not reliable because like Ethernet and IP, if an error is found, the entire message will be discarded, and there will be no automatic retransmission.

What type of port numbers do servers use for common server programs?

Servers use "well-known port numbers." These well-known port numbers have a port number range reserved from port 0 to port 1023. Certain programs are normally on a certain port, like HTTP application programs which are usually on port 80.

What type of port numbers do clients use when they communicate with server programs?

Clients use ephemeral port numbers. Ephemeral port numbers are randomly assigned to a client each time a client initiates or accepts a connection.

What is the range of port numbers for each type of port?

Well-known port numbers range from port 0 to port 1023, and ephemeral port numbers range from port 1024 to port 4999.

How are ephemeral port numbers generated?

They are randomly generated each time a client initiates or accepts a connection.

Why are they called *ephemeral*?

They are called ephemeral because they are discarded whenever a connection is ended.

What is the syntax of a socket?

The syntax of a socket Is "IP address:Socket#"

Is the application layer standard always HTTP?

No, there are many standards that can be used at the application layer (L5).

Which layer has the most standards?

The application layer (L5) has the most standards.

In HTTP request and response message, how is the end of a field indicated?

In HTTP request and response messages the end of a field is indicated by a CRLF or carriage return line feed which indicates the start of a new line.

Do HTTP request messages have headers, data fields, and trailers?

HTTP request messages only have headers, and there is no data field or trailer.

Do HTTP response messages that deliver files have headers, data fields, and trailers?

HTTP response messages that deliver files have headers and data field, but they do not have trailers.

What is encoding? At what layer is encoding done?

Encoding is the conversion of messages into bits.

Encoding is done at the application layer (L5).

Why is the electrical signal generated by a microphone called an analog signal?

The electrical signal generated by a microphone is called an analog signal because it is analogous to the human voice; the signal rises and falls based on the loudness of your voice.

What two things does a codec do?

A codec encodes analog signals into digital signals and decodes digital signals into analog signals.

What is encapsulation? Why is encapsulation necessary for there to be communication between processes operating at the same layer but on different hosts, routers, or switches?

Encapsulation is when a message is placed in the data field of a separate message.

Each layer has a different process when a message is sent. A message can't be sent directly from the application layer on the source host, so it has to send it down the layers, and when it reaches the destination host, it goes back up the layers to the destination hosts application layer. Each layer specializes in something in the transmission of a message.