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**Week 2 Homework**

**Review Questions:**

R1. Web (HTTP), e-mail (SMTP), Remote Terminal Access (Telnet), streaming multimedia (HTTP), file transfer (FTP).

R2. Network architecture is fixed and provides a specific set of services to applications whereas, application architecture is designed by the developer and dictates how the application is designed around its end systems.

R3. In a communication session the client initiates communication and the server waits to be contacted before beginning the session.

R4. In a P2P file-sharing application there is a client and server, however a process can be both client and server. It depends on whether the process is receiving or sending files (i.e. a system can both upload and download files).

R5. A port number is used by a process running on a host (sending) to identify process running on another host (receiving).

R6. To perform a transaction on a remote host you would use TCP as it provides the reliability needed to ensure the *entire* transaction is received wholly and without error.

R7. An example of an application that cannot suffer data loss and is time sensitive would be streaming a video game as input latency has to be as minimal as possible as well and fully intact else the game may blur or feel unresponsive or altogether fail to render on the receiving machine.

R8. The four classes of services transport protocol provide are Reliable Data Transfer (TCP), Throughput (TCP/UDP), Timing (TCP/UDP), and Security (TCP).

R9. SSL operates at the application-layer and the developer has to include SSL code on both the client and server sides of the application.

R10. A handshaking protocol means the client sends a request, the server responds with an acknowledgement or both “shake hands”, acknowledging the connection.

R11. HTTP, FTP, SMTP, and POP3 run on top of TCP instead of UDP as they require their data be transferred without loss and in some cases a connection to be held consistently between client and host.

R12. Using cookies an e-commerce site can keep a record of each customer by storing an id number for each user that accesses the site that corresponds to a user’s login username and password. This cookie will also point the server to any information the server has tied to that id number or cookie.

R13. Web caching can reduce delay when receiving requested objects by ensuring copies of recently used objects are kept in cache meaning it can be quickly retrieved without the need for accessing and searching the entire database. Because of this however, not all objects can be retrieved more quickly as depending on the configuration of the cache only objects in the cache itself will be more quickly accessed.

**Practice Problems:**

P1. A) A user requests Web page that consists of some text and three images. For this page, the client will send one request message and receive four responses.

-False

B) Two distinct web connections can be sent over the same persistent connection.

-True

C) With nonpersistent connections between browser and origin server, it is possible for a single TCP segment to carry two distinct HTTP request messages.

-False

D) The **DATE:** header in the HTTP response message indicates when the object in the response was last modified.

-False

E) HTTP response messages never have an empty message body.

-True

P6. A) The communication header field is used to signal that a persistent connection is being closed and only the server can signal the closing of a connection as no more client requests can be sent after the “close” signal.

B) Accept-Encoding and Content-Encoding are the encryption services provided by HTTP.

C) A single-user client should not maintain 2 or more simultaneous connections with a single server.

D) It is possible for a server to close a connection while the client is transmitting data if a request is made at the same time the server deems the connection “idle” what will happen is the client will reopen the connection and attempt to transmit the data again.

P9. A) Total average response time = access delay + Internet delay

Access delay = (16) \* (.85Mbits) / (1 -15Mbps) = .906

Internet delay = 3

Total average response time = .906 + 3 = **3.906s**

B) Total response time = (.4 \* .01) + (.6 \* 3.906) = .004 + 2.3436 = **2.3476s**