CS 372 Introduction to Computer Networks Self-Check Exercises: Lecture 10

1. What transport-layer protocol does HTTP use? What port number is reserved for this?
   1. **Http uses TCP**
   2. **Port 80**
2. In the HTTP protocol, how is an object addressable?
   1. **By the Uniform Resource Locator (URL) using the host name and path name**
3. What states does HTTP preserve?
   1. **None, it is stateless so it keeps no info about past clients**
4. If an HTTP server can send 14 objects over a single TCP connection, this is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_ HTTP.
   1. **persistent**
5. A client’s browser sends an HTTP request to a website. The website responds with a handshake and sets up a TCP connection. The connection setup takes 2 sec, including the RTT. The browser then sends the request for the website’s index file. The index file references 6 additional image, which are to be requested/downloaded by the client’s browser. How many requests (including the initial request) must be sent by the browser…
6. With non-persistent HTTP? Show the Requests. \_\_\_\_\_\_\_
   1. 12 = my answer **14 = actual**
   2. **RQ 1 TCP connection**
   3. **RQ 2 Website index rq**
   4. **RQ 3 TCP connection rq**
   5. **RQ 4 image 1 rq**
   6. **…**
   7. **RQ 13 TCP connection rq**
   8. **RQ 14 Image #6 rq**
7. With persistent HTTP? Show the Requests. \_\_\_\_\_\_\_
   1. 1 = my answer **8 = actual**
   2. **RQ 1 TCP connection rq**
   3. **RQ 2 Website index rq**
   4. **RQ 3 image #1 rq**
   5. **…**
   6. **RQ 8 image #6 rq**
8. Assuming that all other conditions are equal, which type of HTTP takes longer to complete the entire transfer?
   1. **Non-Persistent takes longer**
9. How much longer?
   1. **(14 req – 8 req) \* 2 sec/req = 12 seconds longer**
10. Why does the HTTP request message require an extra \r\n at the end of the header section?
    1. To signal the end of the header,
    2. **the header must be separate from the entity body**

CS 372 Introduction to Computer Networks Self-Check Exercises: Lecture 11

1. A client-side history of transactions between a client and server using HTTP is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. **cookies**
2. How are these implemented in the HTTP handshaking procedure?
   1. **The response has a cookie header line in the response to the original request**
   2. **Then the next request has a cookie line**
   3. **The cookie file is kept on user’s host and managed by the browser**
   4. **the back end database for the website keeps the cookie number which was sent back by the client**
3. What are the major trade-offs implied by the use of cookies?
   1. **It provides authorization, shopping carts and recommendations as well as preserving the state**
   2. **It also compromises privacy by keeping too much client information especially as the size of the backend database grows**
4. What is the goal of caching in HTTP?
   1. Speed up request time and reduce traffic on institutions access link
   2. **To keep information request from having to go to the goal server. This prevents the same information from being repeatedly downloaded, which would cause additional congestion on the internet (and slow the rate at which the internet is perceived to load at the user end**
5. If none of the links from the HTTP client to the HTTP server are congested, will a connection be faster with or without caching enabled.
   1. Without because it won’t have to check the cache first
   2. **Faster with caching, because anytime you request a file a second time the proxy server will eliminate the necessity for the packets to traverse the internet, saving time**
6. A client in a network with a proxy server requests a 3MiB file from an internet server, x.y.z.com. The network’s proxy server has a 1.54Mbps connection to x.y.z.com. The average response time between the network’s proxy server and the internet origin server (including RTT) is 2 seconds for a small “header-only” HTTP request/response. The file requested by the client is currently in the proxy server cache, but the proxy server relays the client’s request to the internet server with “if-modified since”. Assume that transmissions between the proxy and the origin servers are stream (not packets) at full bandwidth, with negligible propagation delay. How much time is saved if the file has not been modified?
   1. **3 MiB = 3,145,728 bytes 1.54Mbps = 1,540,000 bits per second Response time 2 seconds for header only w/ RTT**
   2. **The connection and GET requests from the proxy server to the origin server, and the delivery from the proxy server to the client are the same in either case. The only difference is in whether or not the file has been modified at the origin server, in which case the new file must be downloaded to the proxy server. As a stream download (not packets) this takes (3 x 1024 x 1024 x 8 bits)/ (1,540,000 bits per second) = 16.34 seconds**

CS 372 Introduction to Computer Networks Self-Check Exercises: Lecture 12

1. Is FTP a peer-to-peer or client/server protocol?
   1. **client/server**
2. What states does the FTP protocol maintain?
   1. **current directory, earlier authentication**
   2. **limit on concurrent connections**
3. Why does FTP open two connections for a file transfer?
   1. One for connection to client
   2. One for the file transfer
   3. **The first connection is for commands. This connection allows the server to maintain the client state so the client can traverse directories and other things on the server. When a file download/upload is requested, the server opens a new connection that is exclusively for transferring the file. This “data” connection is closed when the file transfer is complete but the “command” connection stays open until it is closed by the client or the server.**
4. What are the three major components of e-mail?
   1. **User agent – email client**
   2. **Mail Server –** 
      1. **mailbox – contains incoming messages for user**
      2. **message queue – of outgoing messages stored on server**
   3. **an email protocol like SMTP** 
      1. **simple mail transfer protocol**
         1. **sends mail on port 25**
5. Why are separate protocols required for sending email and receiving email?
   1. **Sending email is a push whereas receiving is a pull**
6. How does SMTP send additional types of objects (other than raw text), since it isn’t built to do so?
   1. MIME?
   2. **Multipurpose Internet mail extension (MIME) version inclusion in the header information allows the inclusion of additional data types.**
7. SMTP is a \_\_\_\_\_\_\_\_\_ protocol, IMAP is a \_\_\_\_\_\_\_\_\_ protocol, POP3 is a \_\_\_\_\_\_\_\_\_ protocol.
   1. **Push**
   2. **Pull – Mail Access – Internet Mail Access**
   3. **Pull – Mail Access – Post Office**
8. What’s the difference between the POP3 and IMAP email protocols (from a user’s point of view)?
   1. POP3 – stateless and can either download and delete or keep on clients
   2. IMAP – keeps user state and keeps files on server
   3. POP3 has two modes, 1. downloads to client then deletes from server and 2. downloads to client but keeps on server.

IMAP displays emails to the client host but keeps the entire directory structure on the server. It also maintains the client’s history. (read/unread messages etc.)

CS 372 Introduction to Computer Networks Self-Check Exercises: Lecture 13

1. How many unique network interface hardware addresses are possible?
   1. 1216 = 1.85 x 1017
   2. **1612 = 281,474,976,710,656**
2. How many unique 32-bit IP addresses are possible?
   1. IPv4 =
   2. **32 binary digits means 232 = 4,294,967,296 unique numbers. Not enough for every host**
3. The dotted-decimal form of 32-bit internet addresses is composed of 4 decimal numbers, separated by periods. What is range of possible values for each of the four decimal numbers?
   1. 0 to 256
   2. **0 to 255**
4. What organization manages the .org TLD?
   1. **Public Interest Registry**
5. What is the Domain Name System (DNS) application-layer protocol used for? What transport-layer protocol does it make use of?
   1. **It is used to resolve human friendly word based web addresses into Network-layer IP addresses and alias web and mail servers**
   2. **UDP**
6. In an internet name, what is the highest-priority component? The second-highest priority component? What are subsequently prioritized components used for?
   1. **TLD is highest**
   2. **domain name – fields left of this are used internally as host names**
   3. **hierarchy**
7. Suppose that we send a DNS request with ID # 46921.
   1. What is the little-endian representation (hexadecimal)? \_\_\_\_\_\_\_\_\_\_\_\_
      1. 947B
      2. **49B7**
   2. What is the big-endian representation (hexadecimal)? \_\_\_\_\_\_\_\_\_\_\_\_
      1. B749
      2. **B749 original decimal conversion is big endian**
   3. Which representation is required for network communication?
      1. **Big Endian is needed for network order**