Quiz 2

1. Which of the characteristics below are associated with a client-server approach to structuring network applications (as opposed to a P2P approach)?

A. There is a server with a well-known server IP address.
B. There is not a server that is always on.
C. There is a server that is always on.
D. A process requests service from those it contacts and will provide service to processes that contact it.

2. What information does the type "A" resource record hold in the DNS database? Check all that apply.

A. An alias name and a true name for a server.
B. A hostname and an IP address.
C. A domain name and the name of the authoritative name server for that domain.
D. A name and the name of the SMTP server associated with that name.

3. The transfer of an html file from one host to another is

A. loss-tolerant and time sensitive
B. loss-intolerant and time sensitive
C. loss-intolerant and time insensitive
D. none of the above

4. A browser will generate header lines as a function of

A. browser type and version
B. user configuration of browser
C. whether the browser has a cached version of the requested object
D. all of the above

5. Suppose a client sends an HTTP request message with the

   If-modified-since:header. Suppose the object in a server has not changed since the last time a client retrieved the object. Then the server will send a response message with the status code:

A. 200 OK
B. 404 Not Found
C. 304 Not Modified
D. none of the above

6. SMTP is used to

A. to transfer messages from one mail server to another
B. to transfer messages from mail server to a user agent
C. to define the format of message headers
D. all of the above

7. Local DNS name servers

A. never cache resource records
B. cache resource records, but discard them after a period of time that is on the order of a few days
C. cache resource records and never discard them
D. obtain resource records from Web caches

8. What is an HTTP cookie used for?

A. A cookie is used to spoof client identity to an HTTP server.
B. A cookie is a code used by a server, carried on a client's HTTP request, to access information the server had earlier stored about an earlier interaction with this Web browser. [Think about the distinction between a browser and a person.
C. A cookies is a code used by a server, carried on a client's HTTP request, to access information the server had earlier stored about an earlier interaction with this person. [Think about the distinction between a browser and a person.]
D. A cookie is a code used by a client to authenticate a person's identity to an HTTP server.

9. If an HTTP request message uses the

   Accept-language: fr

   header, and the server only has an English version of the object, then the server will return the

   404 Document Not Found

   error message.

A. True
B. False

10. Suppose a client is sending an HTTP GET request message to a web server, gaia.cs.umass.edu. Suppose the client-to-server HTTP GET message is the following (same as in previous problem):

    GET /kurose_ross_sandbox/interactive/quotation2.htm HTTP/1.1
    Host: gaia.cs.umass.edu

Accept: text/plain, text/html, text/xml, image/jpeg, image/gif, audio/mpeg, audio/mp4, video/wmv, video/mp4,
Accept-Language: en-us, en-gb;q=0.1, en;q=0.7, fr, fr-ch, da, de, fi
If-Modified-Since: Wed, 09 Sep 2020 16:06:01 -0700
User Agent: Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/535.11 (KHTML, like Gecko) Chrome/17.0.963.56 Safari/535.11

Does the client have a cached copy of the object being requested?

A. There's not enough information in the header to answer this question.
B. Yes, because HTTP 1.1 is being used.
C. Yes, because this is a conditional GET, as evidenced by the If-Modified-Since field.
D. No, because a client would not request an object if it had that object in its cache.

11. Which of the following are the advantages of using a web cache? Select one or more answers.

A. Caching allows an origin server to more carefully track which clients are requesting and receiving which web objects.
B. Overall, caching requires fewer devices/hosts to satisfy a web request, thus saving on server/cache costs.
C. Caching uses less bandwidth coming into an institutional network where the client is located, if the cache is also located in that institutional network.
D. Caching generally provides for a faster page load time at the client, if the web cache is in the client's institutional network, because the page is loaded from the nearby cache rather than from the distant server.

12. Which of the characteristics below are associated with a P2P approach to structuring network applications (as opposed to a client-server approach)?

A. There is a server with a well-known server IP address.
B. There that is always on.is *not* a server
C. There is a server that is always on
D. HTTP uses this application structure.

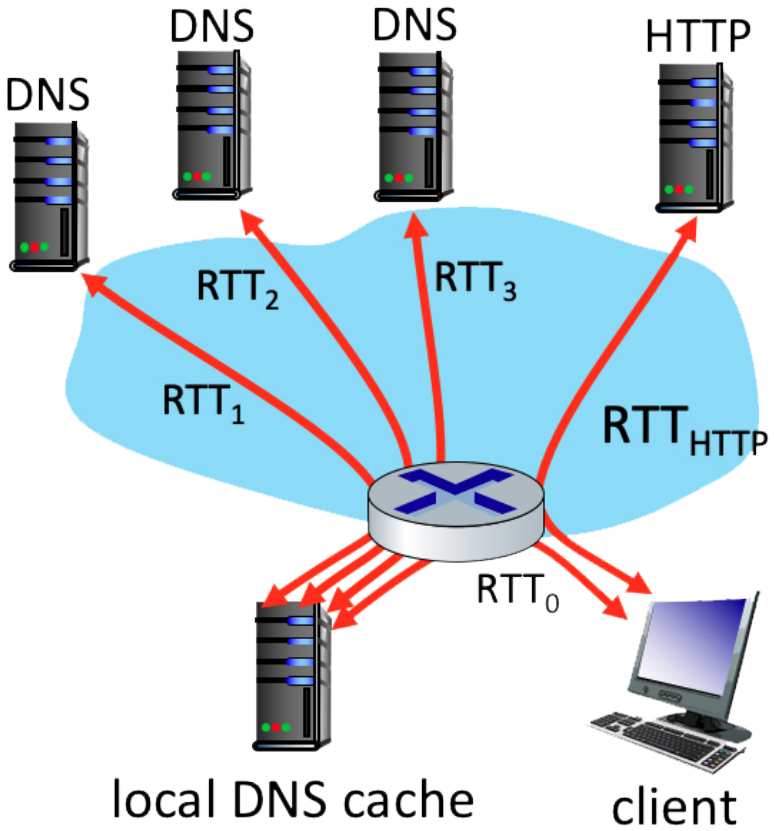
13. When an application uses a UDP socket, what transport services are provided to the application by UDP? Check all that apply.

A. ***Congestion control.*** The service will control senders so that the senders do not collectively send more data than links in the network can handle.
B. ***Loss-free data transfer***. The service will reliably transfer all data to the receiver, recovering from packets dropped in the network due to router buffer overflow.

C. ***Best effort service***. The service will make a best effort to deliver data to the destination but makes no guarantees that any particular segment of data will actually get there.

D. ***Real-time delivery.*** The service will guarantee that data will be delivered to the receiver within a specified time bound.

14. Suppose within your Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the IP address. Suppose that four DNS servers are visited before your host receives the IP address from DNS. The first DNS server visited is the local DNS cache, with an RTT delay of RTT_0 = 1 msecs. The second, third and fourth DNS servers contacted have RTTs of 40, 14, and 1 msecs, respectively. Initially, let's suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Suppose the RTT between the local host and the Web server containing the object is RTT_{HTTP} = 61 msecs.



Assuming zero transmission time for the HTML object, how much time (in msec) elapses from when the client clicks on the link until the client receives the object?

A. 178
B. 117
C. 56
D. 290

The time from when the Web request is made in the browser until the page is displayed in the browser is: RTT0 + RTT1 + RTT2 + RTT3 + 2*RTTHTTP = 1 + 40 + 14 + 1 + 2*61 = 178 msecs. Note that 2 RTTHTTP are needed to fetch the HTML object - one RTTHTTP to establish the TCP connection, and then one RTTHTTP to perform the HTTP GET/response over that TCP connection.

15. Now suppose the HTML object references 7 very small objects on the same server. Neglecting transmission times, how much time (in msec) elapses from when the client clicks on the link until the base object and all 7 additional objects are received from web server at the client, assuming non-persistent HTTP and no parallel TCP connections?

A. 1032
B. 178
C. 910
D. 56

The time from when the Web request is made in the browser until the page is displayed in the browser is: RTT0 + RTT1 + RTT2 + RTT3 + 2*RTTHTTP + 2*7*RTTHTTP = 1 + 40 + 14 + 1 + 2*61 + 2*7*61 = 1032 msecs. Note that two RTTHTTP delays are needed to fetch the base HTML object - one RTTHTTP to establish the TCP connection, and one RTTHTTP to send the HTTP request, and receive the HTTP reply. Then, serially, for each of the 7 embedded objects, a delay of 2*RTTHTTP is needed - one RTTHTTP to establish the TCP connection and then one RTTHTTP to perform the HTTP GET/response over that TCP connection.

16. Suppose the HTML object references 7 very small objects on the same server, but assume that the client is configured to support a maximum of 5 parallel TCP connections, with non-persistent HTTP.

A. 1032
B. 178
C. 422
D. 300

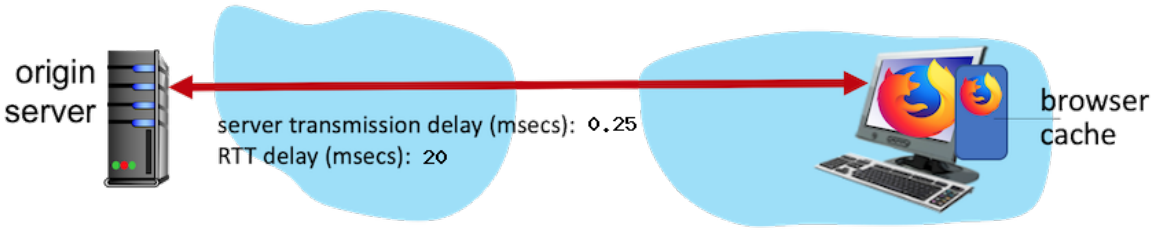
Since there are 7 objects, there's a delay of 56 msec for the DNS query, two RTTHTTP for the base page, and 4*RTTHTTP for the objects since the requests for 5 of these objects can be run in parallel (2 RTTHTTP) and the rest can be done after (2 RTTHTTP). The total is 56 + 122 + 122 + 122 = 422 msec. As in 2 above, 2 RTTHTTP are needed to fetch the base HTML object - one RTTHTTP to establish the TCP connection, and one RTTHTTP to send the HTTP request and receive the HTTP reply containing the base HTML object. Once the base object is received at the client, the 7 HTTP GETS for the embedded objects can proceed in parallel. Each (in parallel) requires two RTTHTTP delays - one RTTHTTP to set up the TCP connection, and one RTTHTTP to perform the HTTP GET/response for an embedded object.

17. Suppose the HTML object references 7 very small objects on the same server, but assume that the client is configured to support a maximum of 5 parallel TCP connections, with persistent HTTP.

A. 178
B. 422
C. 300
D. 544

Since there are 7 objects, there's a delay of 56 msec for the DNS query. There's also a delay of two RTTHTTP for the base page, and 2 RTTHTTP for the objects. The total is 56 + 122 + 122 = 300 msec.As in 2 and 3 above, two RTTHTTP delays are needed to fetch the base HTML object - one RTTHTTP to establish the TCP connection, and one RTTHTTP to send the HTTP request, and receive the HTTP reply containing the base HTML object. However, with persistent HTTP, this TCP connection will remain open for future HTTP requests, which will therefore not incur a TCP establishment delay. Once the base object is received at the client, the maximum of five requests can proceed in parallel, each retrieving one of the 7 embedded objects. Each (in parallel) requires only one RTTHTTP delay to perform the HTTP GET/response for an embedded object. Once these first five objects have been retrieved, (if necessary) the remaining embedded objects can be retrieved (in parallel). This second round of HTTP GET/response to retreive the remaining embedded objects takes only one more RTTHTTP, since the TCP connection has remained open.

18. Consider an HTTP server and client as shown in the figure below. Suppose that the RTT delay between the client and server is 20 msecs; the time a server needs to transmit an object into its outgoing link is 0.25 msecs; and any other HTTP message not containing an object has a negligible (zero) transmission time. Suppose the client again makes 60 requests, one after the other, waiting for a reply to a request before sending the next request.



Assume the client is using HTTP 1.1 and the IF-MODIFIED-SINCE header line. Assume 50% of the objects requested have NOT changed since the client downloaded them (before these 60 downloads are performed)

How much time elapses (in milliseconds) between the client transmitting the first request, and the completion of the last request?

A. 1200
B. 1515
C. 2407.5
D. 1207.5

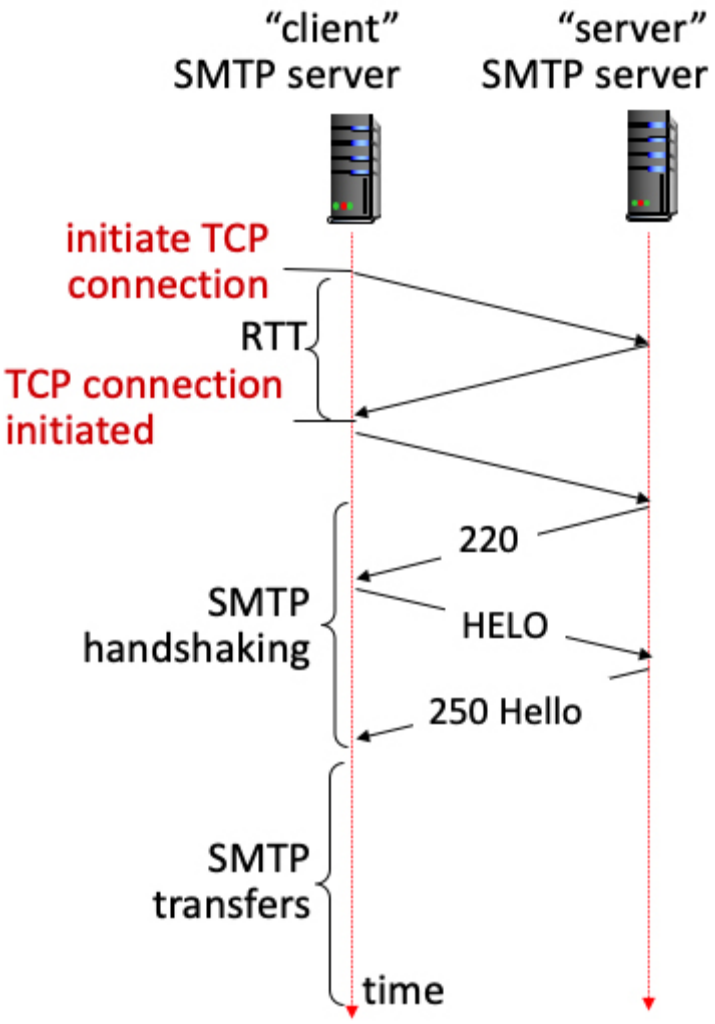
(RTT * NUM_PACKETS) + (NUM_PACKETS * (_PERCENT__NOT CACHED / 100) * TRANS_DELAY) = (20 * 60) + (60 * ((100-50) / 100) * 0.25) = 1207.5 ms

19. We learned that in HTTP web browser caching, HTTP local web server caching, and in local DNS caching, that a user benefits (e.g., shorter delays over the case of no caching) from finding a local/nearby copy of a requested item. In which of the following forms of caching does a user benefit from its not only from its own recent requests (and cached replies) but also from recent requests made from other users?

A. HTTP local web caching
B. Local DNS server caching
C. HTTP browser caching

20. How many RTTs are there from when a client first contacts an email server (by initiating a TCP session) to when the client can begin sending the email message itself – that is following all initial TCP or SMTP handshaking required?

Recall the figure below from our class notes:


"client"
SMTP server
"server"
SMTP server
initiate TCP
connection
RTT
TCP connection
initiated
220
SMTP
handshaking
HELO
250 Hello
SMTP
transfers
time

A. 3
B. 2.5
C. 1
D. 2