CSCE 5580 – Computer Networks
Assignment - 2

Sai Charan Reddy Bushireddy
Student id : 11642757

Question 1

(a) In [1]-[3], which of the applications use UDP?
(b) Which of the applications use TCP?

[1]: do a transaction from a remote client to a server as fast as possible, while the reliability of the transaction is not required.

[2]: send an email to another user.

[3]: download a file with high accuracy.

[1] : In the quick transaction from remote client to server, without any concern on the reliability. It should probably be using the UDP(User Datagram Protocol) as speed is prioritized over reliability in this protocol.

[2]: In sending an e-mail to the user we tend to use TCP(Transfer Control Protocol), because in this type of applications we should have more reliability, accuracy in data transmission which can be achieved by using TCP.

[3]: TCP (Transmission Control Protocol) is used in applications where reliability & accuracy are important in data transmission, such as sending emails as in previous case and downloading files.

Question 2

In P2P, there is no client process or server process. True or false? Please also give a brief explanation.

That statement is False.
Because in peer to peer (P2P) network, there are both the client and Server processes in that, even though they are not explicitly mentioned in that network as client & server in the network.

In the peer-to-peer network, the peer sending the file can be considered as a server and the one receiving the file can be termed as the client. Client process is known form receiving a file, and Server process is known for sending the file.

Question 3

In HTTP, web caching can help provide the requested objects for users such that users do not have to request the objects from the original server. Will web caching reduce the delay for all objects requested by a user or for only some of the objects? True or false?
Please also give a brief explanation.

This is True,

Web caching serves the purpose to bring the asked content physically nearer to the user, by keeping the data within the local area network(LAN) as per the user's location. This offers a lot of benefits by this nearness,
Firstly, it will reduce the time in accessing the web resources by the user who is requesting the information.
Secondly, it not only benefits the cached objects but also benefits the non-cached objects by reducing the traffic on the overall network.
So essentially, caching reduces the time needed to retrieve frequently accessed information from the distant servers and this is achieved by storing the information in same LAN as user's LAN. Ultimately improving the web responsiveness, overall efficiency and content delivery.

Question 4

Consider an e-commerce site that wants to keep a purchase record for each of its customers. Briefly describe how this can be done with cookies.

E-commerce platforms can enhance user experience by utilizing cookies to maintain individual purchase histories of the users based on their previous shopping history. By generating distinct cookies for each interaction or transaction made by a user, such as details of items bought and the date of purchase, the platform can store this data on the user's device. When the user revisits or logs back into the platform, the server retrieves the stored cookie, allowing access to the user's transaction history. This functionality enables the platform to showcase previous purchases, suggest related products, streamline order tracking, and customize the shopping journey. Employing cookies for recording purchases significantly boosts customer interaction, improves service quality, and simplifies the shopping process for users.

Question 5

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 DNS server, so a DNS lookup is necessary to obtain the IP address through the hierarchy of the DNS servers. Suppose that 4 DNS servers (1 root DNS server, 1 TLD DNS server, and 2 authoritative DNS servers) are visited before your host

receives the IP address from DNS; the successive visits incur an RTT of RTT1, RTT2, RTT3, and RTT4, respectively.

Question: how much time elapses from when the client clicks on the link until the client receives the IP address of the target reserve?

In the time elapsed from the user clicking the link to obtain a webpage and the client receives the IP address of the target server involves multiple DNS server visits by user bowser.

The process initiates with a preliminary DNS inquiry to the root DNS server (RTT1), subsequently guiding the client towards the pertinent Top-Level Domain (TLD) DNS server (RTT2). This TLD server further directs the client to an authoritative DNS server specific to the domain in question (RTT3). Should the IP address remain undiscovered, an additional round-trip time may ensue as the client reaches out to another authoritative DNS server (RTT4). Therefore, the cumulative duration involved in this DNS resolution procedure equates to the aggregate of these individual round-trip times: **RTT1 + RTT2 + RTT3 + RTT4.**

Further suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT0 denote the RTT between the local host and the server containing the object.

Question: Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object?

After acquiring the IP address, the overall response duration encompasses the interval required to establish the TCP connection (1 RTT0) plus the period needed to request and retrieve the small object (1 RTT0), alongside the DNS lookup duration (RTT1 + RTT2 + RTT3 + RTT4). Consequently, the precise computation of the total elapsed time, from the moment the client initiates a click on the link to when the object is received by the client, is:
Total Duration = (**RTT1 + RTT2 + RTT3 + RTT4) + 2 * RTT0**