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Assignment 4
HTTP +DNS (Paper)

Question 1 -

a -

(As the tutor said, we here not worried about everything which is not the size of the file, the number of pictures, and the size of one picture. Also, the 2) is deleted).

For all of the method we need to add the time that openning the connection and the time of the request of the main page, which is equal to 2RTT + T1. Where T1 is the time for the main page.
And RTT is the time for a small packet to travel from client to server and back.

Then, we need to calculate the sending time of the pictures. We need first to calculate the own time to each method, then, multiply the result by X. Where X is the number of pictures. The details for each method is giving in the following points.

1) HTTP Non-Persisitent :
Time = 2RTT + T1 + (2RTT + T2) * X
For all the picture, this method open a new socket, and takes 2RTT one for TCP connection and other for HTTP image/text file. Adding the T2 wich is the time for each picture, we're done.

2) Not requierd.

3) HTTP Persistent
Time = 2RTT + T1 + (RTT + T2) * X
For all the picture, this method, this method use the same socket, and takes only one RTT because the TCP connection for each object is not required. Adding the T2 wich is the time for each picture, we're done.

4) HTTP Persistent with Pipeline :

Time = 2RTT + T1 + RTT + T2 * X

This method use the same socket, and takes only one RTT to base the file or the reference file. Attention that the method doesn't need the RTT for each picture. Adding the T2 wich is the time for each picture, we're done.

b – The differences between all the methods saw in 'a -' are the following:

	HTTP non-persistent	HTTP non-persistent + parallel	HTTP persistent	HTTP persistent with pipelining
Connection	Server close the connection after sending response.	Server close the connection after sending response.	Server leave connection open after sending response.	Server leave connection open after sending response.
Time required (Assuming 2RTT for connection establishment for all the methods)	Requires 2 RTTs per object.	Requires one RTT (assuming no window limit) for all the objects.	Requires one RTT for each object.	Requires one RTT (assuming no window limit) for all the objects.
Socket	One socket is created for each object and closed after each transfer.	One socket is created for each transfer, and closed only at the end of all the transfers.	One socket is open for all the objects, and closed at the end of all the transfers.	One socket is created is and send all the objects with one transfer, then is closed.
Advantage	More secure because socket is created for each object.	Same that HTTP non-persistent + fewer time of transfers.	Lower CPU and memory usage because there are less number of connections.	Same that HTTP persistent + fewer time of transfers.

To resume, briefly, either the non-persistent method open a socket for each transfer, the persistent method doesn't.
The parallel and pipeline method send everything in a row.

c – The differences between HTTP GET and HTTP POST are the following:

	HTTP GET	HTTP POST
Bookmarked	Can be bookmarked	Cannot.
Cached	Can be cached.	Cannot.
History	Parameters remain in browser history.	Parameters are not saved in browser history.
Security	Less secure because data sent is part of the URL Never used when sending passwords.	Safer because the parameters are not stored in browser history or in web server logs.
Visibility	Data is visible to everyone in the URL.	Data is not displayed in the URL.
Use	Should only retrieve data.	Submit an entity to the specified resource, often causing a change in state or side effects on the server.

Question 2 -

a - DNS (Domain Name System) is, a huge database of networks names and IP addresses. Note that without DNS, Internet couldn't exist. The DNS have the image of the phonebook of the Internet.
Why does the DNS is so important ?
DNS assigns user-friendly domain names to one unique IP addresses. It also translate the data used by the computer to communicate, into words and phrases, understood by humans.

To explain how the DNS works let take an example :

Dan type a domain name, like www.facebook.com into his browser. The job of the DNS is to translate the browser name into the IP address associated with the website. Then, the your computer is connected with the web host.

The principal functions of the DNS are the following :

Locating IP address to specific site names.

Storing the data.

Distribute the DNS over a vast networks of connections.

Explanation about how the DNS work to search the IP address :

First of all, if the website is known, the IP address is stored into the cache, which is into the computer of the user.

If the website is a new request here are the step :

The DNS server asks the root DNS server for the adress of the top-level server.

Then, the DNS server asks the top-level (the address have been receive thanks to the root server) DNS server for the IP address of the authoritative server of the website.

Then, with the IP address of the authoritative server of the website, the DNS server can redirect the request of the client to the domain name, which send back the IP address of the host of the server.

A connection is now available between the client and the server.

If the top-level DNS server don't find the IP address of the website server, he should send the IP address of the authoritative server which is a database of domain server and IP address.

b – The only change to do is on the authoritative server. Like said above, if the IP of the server of Yossi is not found, the top-level server send the IP of the authoritative server. Then, the authoritative send back the IP address of the domain name server. So if the IP address of the website of Yossi have change, an update need to be done in the authoritative server.

To resume, Yossi have to change the IP adress into the authoritative server from 66.96.147.150 to 66.96.147.211

c – In the case that Yossi change of company, the updates needed are the following :

First, in the top-level server, a change have to be made in the IP address of the authoritative server. Indeed, the IP address of the new company is not the same that the old.

Second, because the domain name server of Yossi is new for the new company, they have to put the IP address of the server of the website into the authoritative server of there company.

Question 3 -

a –

   The first solution (client-server) is taking 300 seconds.

<u>Here the explanation :</u>

The movie has a size of 1GBytes.

Since Dan has 30 friends, we can calculate the time as :

1G * 30 / 100M = 300 seconds (The 100MBytes/seconds come from Dan's computer).

We also need to calculate how much time the slowest computers of Dan friends take to get the movie.

This is the friends with 4MBytes/seconds.

Then, we have : 1G/4M = 250 seconds.

The result is the lowest time between the both, in others words: 300 seconds.

   The second solution (P2P) takes 250 seconds to be done.

<u>Here the explanation :</u>

The time that the 30 friends may access to the data is :

1G * 30 / 10M + 50M + 50M + 20M = 230seconds. This results come from the table associated with the question, which display the rate of the friends of Dan.

Another time, the slowest friends should finish the done in 250 seconds.

Also, the time that Dan put the movie is : 1G/10M = 100 seconds. Note that here, we don't have to multiply the time than Dan share the movie by the number of friends thanks to the P2P method.

Like for the first method, the time final is the lowest time, is 250 seconds.

To conclude, the first method use 300 seconds, but the second only 250. So Dan may choose the second if he wants to share the movie quicker.

b – For the client server model (first method) it make sense to change the rate of the server (100MBytes/seconds), because this is the longest operation done in the sharing. If he could be improved the final time could decrease to 250 seconds.

For the P2P model (second method) , it make sense to change the rate of the slowest friend server (5MBytes/seconds), because this his the longest operation done in the sharing. If he could be improved the final time could decrease to 230 seconds.

c – The main problems linked to the network P2P are the following :

Low security.

Localization time longer.

The "freeloading" : Need an active participation of the members.

Btorrent, have a singularity : clients don't make part to a global network (which contains all the users of the protocol), but are classified by file. : every single file got his number of users. All these groups are organized with a main component the trackers, which is an dynamic directory of interesting client by one file.

This is a good answer to the problem of localization.

In addition, the big file are considering like a number of piece and every piece can be download by some different source.

A same download may concern numerous files. Then, for a download of numerous files, it's possible to get a piece which contains the end of a file, and the beginning of another file.

Then, the download time should be better.

Question 4 -

For a unique domain name, it's possible to get numerous IP addresses.

That it's because for a domain name, if one IP address is already used by a lot of users, it's better to use another IP address. This term is call the "load balancing". This may optimize resource use, maximize throughput, minimize response time, and avoid overload of any single resource.

Note that the Round-Robin algorithm is used to calculate which IP address is send to which user. And this by the more logical way to get a load balancing optimized at his maximum.

Here is a breve explanation about how the IP are deal :

The first user get the firstIP, the second get the second IP…

Assuming that n is the number of IP that the domain contains, the n+1 user get the first IP and like this continue the loop.

Question 5 -

In DNS the differences between the Local Name Server and the Authoritative Server are the following :

The two servers do not have the same job.

The local name server use the cache as a database of IP, and the authoritative server use the company database. In addition, the local name server is not used just as a database, but also as a way of communicate with the root server, the top level server, or the authoritative server, and finaly, with the client to establish the connection.

The authoritative server do not communicate with any server except the local name server. He his used like a database for each company of domain names. In this database there are the domain names attribute to each website, and associated with IP addresses.

One one the common point there is between both server is the use of the database. But also here there is a difference. The local name server contains a database naming cache, which contains the website that already been used. As said above, the database of the authoritative server is defined by companies.