Assignment 2

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CS536

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Problem 1. HTTP and DNS

a. How much time elapses from when the client clicks on the link until the client receives the object ?
Ans. Since the client needs to contact n different DNS servers to get destination's ip address, the DNS-look up time is:

$$Time_{dns} = \sum_{i=1}^{n} RTT_i$$

Assume the connection use TCP, it will take another $2 \times RRT_0$ to establish and receive the file. Therefore, the total time is:

$$\text{Total Time} = 2 \times RTT_0 + \sum_{i=1}^{n} RTT_i$$

b.
- Non-persistent HTTP with no parallel TCP connection.
Ans. Since this is non-persistent HTTP with no parallel TCP connection, in addition to the time calculated above, there will be another 8 TCP connections set up and download files. Therefore, total time is:

$$2 \times RTT_0 + \sum_{i=1}^{n} RTT_i + 8 \times 2 \times RTT_0 = 18 \times RTT_0 + \sum_{i=1}^{n} RTT_i$$

- Non-persistent HTTP with 5 parallel TCP connection.
Ans. Similarly, with non-persistent HTTP, there are 8 TCP connections set up and request to download; however, since there are 5 parallel connections, we reduces the transfering time of 8 files to $\lceil 8/5 \rceil \times 2 \times RTT_0$. The new total time is:

$$2 \times RTT_0 + \sum_{i=1}^{n} RTT_i + 2 \times 2 \times RTT_0 = 6 \times RTT_0 + \sum_{i=1}^{n} RTT_i$$

- Persistent HTTP with pipelining ?
Ans: For persistent HTTP, there will be only one TCP connection set up, and with pipelining, the host will get all 8 files at the same time. The time to transfer 8 files becomes RTT_0. Therefore, the total time is:

$$2 \times RTT_0 + \sum_{i=1}^{n} RTT_i + \times RTT_0 = 3 \times RTT_0 + \sum_{i=1}^{n} RTT_i$$

Problem 2. DNS

a. Here are the results:
`@m.root-servers.net any --> @f.edu-servers.net --> @harbor.ecn.purdue.edu`
root: `dig +norecurse @m.root-servers.net any xinu01.cs.purdue.edu`

```
;; AUTHORITY SECTION:
edu. 172800 IN NS a.edu-servers.net.
edu. 172800 IN NS l.edu-servers.net.
edu. 172800 IN NS d.edu-servers.net.
edu. 172800 IN NS g.edu-servers.net.
edu. 172800 IN NS c.edu-servers.net.
edu. 172800 IN NS f.edu-servers.net.
```

top-level: `dig +norecurse @f.edu-servers.net any xinu01.cs.purdue.edu`

```
;; AUTHORITY SECTION:
purdue.edu. 172800 IN NS harbor.ecn.purdue.edu.
purdue.edu. 172800 IN NS pendragon.cs.purdue.edu.
purdue.edu. 172800 IN NS ns1.rice.edu.
purdue.edu. 172800 IN NS ns3.purdue.edu.
```

authorative: `dig +norecurse @harbor.ecn.purdue.edu xinu01.cs.purdue.edu`

```
;; ANSWER SECTION:
xinu01.cs.purdue.edu. 86400 IN A 128.10.3.51
```

b.
- **google.com** I tried:
`@m.root-servers.net any --> @c.gtld-servers.net --> @ns.googe.com`
root:

```
;; AUTHORITY SECTION:
com. 172800 IN NS e.gtld-servers.net.
com. 172800 IN NS m.gtld-servers.net.
com. 172800 IN NS i.gtld-servers.net.
com. 172800 IN NS c.gtld-servers.net.
com. 172800 IN NS h.gtld-servers.net.
com. 172800 IN NS d.gtld-servers.net.
com. 172800 IN NS k.gtld-servers.net.
com. 172800 IN NS b.gtld-servers.net.
com. 172800 IN NS l.gtld-servers.net.
com. 172800 IN NS a.gtld-servers.net.
com. 172800 IN NS g.gtld-servers.net.
com. 172800 IN NS f.gtld-servers.net.
com. 172800 IN NS j.gtld-servers.net.
```

top level: Answer

```
;; AUTHORITY SECTION:
google.com. 172800 IN NS ns2.google.com.
google.com. 172800 IN NS ns1.google.com.
google.com. 172800 IN NS ns3.google.com.
google.com. 172800 IN NS ns4.google.com.
```

authorative:

```
;; ANSWER SECTION:
google.com. 300 IN A 128.210.224.45
google.com. 300 IN A 128.210.224.59
google.com. 300 IN A 128.210.224.29
google.com. 300 IN A 128.210.224.38
google.com. 300 IN A 128.210.224.57
google.com. 300 IN A 128.210.224.53
google.com. 300 IN A 128.210.224.44
google.com. 300 IN A 128.210.224.34
google.com. 300 IN A 128.210.224.30
google.com. 300 IN A 128.210.224.19
google.com. 300 IN A 128.210.224.49
google.com. 300 IN A 128.210.224.23
google.com. 300 IN A 128.210.224.27
google.com. 300 IN A 128.210.224.15
google.com. 300 IN A 128.210.224.42
```

- **amazon.com** I tried:
  `@m.root-servers.net any --> @c.gtld-servers.net --> @pdns1.ultradns.net`
  root

```
;; AUTHORITY SECTION:
com. 172800 IN NS d.gtld-servers.net.
com. 172800 IN NS h.gtld-servers.net.
com. 172800 IN NS f.gtld-servers.net.
com. 172800 IN NS c.gtld-servers.net.
com. 172800 IN NS b.gtld-servers.net.
com. 172800 IN NS g.gtld-servers.net.
com. 172800 IN NS a.gtld-servers.net.
com. 172800 IN NS e.gtld-servers.net.
com. 172800 IN NS i.gtld-servers.net.
com. 172800 IN NS m.gtld-servers.net.
com. 172800 IN NS l.gtld-servers.net.
com. 172800 IN NS j.gtld-servers.net.
com. 172800 IN NS k.gtld-servers.net
```

top-level:

```
;; AUTHORITY SECTION:
amazon.com. 172800 IN NS pdns1.ultradns.net.
```

```
amazon.com. 172800 IN NS pdns6.ultradns.co.uk.
amazon.com. 172800 IN NS ns1.p31.dynect.net.
amazon.com. 172800 IN NS ns3.p31.dynect.net.
amazon.com. 172800 IN NS ns2.p31.dynect.net.
amazon.com. 172800 IN NS ns4.p31.dynect.net.
```

authorative answer:

```
;; ANSWER SECTION:
amazon.com. 60 IN A 54.239.25.200
amazon.com. 60 IN A 54.239.17.6
amazon.com. 60 IN A 54.239.26.128
amazon.com. 60 IN A 54.239.17.7
amazon.com. 60 IN A 54.239.25.192
amazon.com. 60 IN A 54.239.25.208
```