Assignment 2

Rusu Wu

11694764

1. a.False
   b.True
   c.False
   d.False
   e.False

2. Application-layer protocol: DNS
   Transport-layer protocol: UDP (For DNS)and TCP (For HTTP)

3. a.cs453/index.html (First line after GET)
   b.HTTP/1.1 (First Line after the URL of the document requested by the browser)
   c. A persistent connection (Keep-Alive at the last line)
   d.It does not provide the IP adress, but it has the host domain name: gaia.cs.umass.edu
   e. Mozilla/5.0 (User-Agent). Since different browsers would present different web page event the get the same HTTP reponse message, acquiring the host browser can help servers response distinct format of the HTTP reponse message for the browser.

4. Suppose $Time$ as the time elapses from when the client clicks on the link until the client receives the object
$$Time = 2 \times RRT_0 + RRT_1 + ... + RRT_n$$

5. a: $Time = 18 \times RRT_0 + RRT_1 + ... + RRT_n$
   b: $Time = 6 \times RRT_0 + RRT_1 + ... + RRT_n$
   c: $Time = 10 \times RRT_0 + RRT_1 + ... + RRT_n$

6. a:From Figure 2.12, Access link rate= R = 15Mbps
   $\Delta = L/R = 850000 bit/(15 \times 10^6 bps) = 0.0567s$
   $\beta = 16$
   Average access delay=$\Delta/(1 - \Delta\beta) = 0.6071$
   Total average response time = the average access delay + the average Internet delay=3+0.607= 3.6071s

   b: Hit delay=0s
   When it does't hit: Average access delay=$\Delta/(1 - (0.6)\Delta\beta) = 0.12431$
   Total average response time= $(0.1243 + 3s) \times 0.4 = 1.2497$

7. First we need to receive the web page, then the browser know what the sub-objects are, and the delay is:
$$Delay_1 = 2 \times (200/150) + 2 \times t_{prop} + 200/150 + t_{prop} + 100000/150 + t_{prop} = 670.7s + 4t_{prop}$$

Non-persistent HTTP: $Delay_{np} = Delay_1 + 10 \times (Delay_1) = 7377.3 + 44 \times t_{prop}$

Parallel downloap non-persistent HTTP: $Delay_{pnp} = Delay_1 + 2 \times (200/15) + 2 \times t_{prop} + 200/15 + t_{prop} + 100000/15 + t_{prop} = 7377.3s + 8 \times t_{prop}$

Persistent HTTP: $Delay_p = Delay_1 + 10 \times (200/150 + t_{prop} + 100000/150 + t_{prop} = 7377.3s + 8 \times t_{prop} = 7350.7s + 24 \times t_{prop}$

Since the link is 10m,t_prop is really small. Therefore,Parallel downloap non-persistent HTTP does not have much improvement in the case. Also, Persisten HTTP does not have a significant gain when it compared to the non-persistnt case.

8. a:$N \times N$
   b:$2 \times N$