Answer:-

- Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1=500kbps, R2=2 Mbps, and R3= 1Mbps.

  A. Assuming no other traffic in the network, what is the throughput for the file transfer?

     Ans:
     # the throughput for the file transfer = min{R1,R2,R3}
     =min{500kbps,1024kbpd,2048kbps} = 500kbps.

  B. Suppose the file is 4 mullion bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

     Ans:
     # Time to transfer file = file_size/throughput for file transfer
     # file_size:4*10^6= 4000000*8 =32000000 bits
     # throughput for file transfer = 500Kbps = 512000 bps
     # Time to transfer file = 32000000/512000= 62.5s

  C. Repeat (a) and (b), but now with R2 reduced to 100 kbps.
     Ans:
     # R2=100kbps, R1=500kbps, R3=1024kbps
     # file_size = 32000000 bits
     # throughput for file transfer=min{R1,R2,R3}
     =min{100kbps,500kbps,1024kbps} = 100kbps
     = 102400 bps
     # Time to transfer file = 32000000/102400= 312.5s

- For a P2P file-sharing application, do you agree with the statement, "There is no notion of client and server sides of a communication session"? why or why not?
  Ans:
  No. As stated in the text, all communication sessions have a client side and a server side. In a P2P file-sharing application, the peer that is receiving a file is typically the client and the peer that is sending the file is typically the server.

- What information is used by a process running on one host to identify a process running on another host?
  Ans:
  Port number and IP address.

- Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use UDP or TCP? why?

  Ans:

  would use UDP, Because UDP use one roundtrip time (RTT) to complete transaction, and without all error-checking stuff. All back-and-forth communication will be faster than TCP

- Why do HTTP, SMTP, and POP3 run on top of TCP rather than on UDP?

  Ans:

  # this Because ,TCP reliable protocol, for that packets sent with TCP are tracked so no data is lost or corrupted in transit

  or

  # this Because TCP reliable protocol,so it have an accurate on a data transmission

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

  Ans:

  1) Server will creates a unique identification number fo user requst

  2) Then it will save it in its back-end database and returns this identification number as a cookie number.

  3) This cookie number is stored on the user's host and is managed by the browser.

  4) During each subsequent visit (and purchase),this cookie will send with each request by browser to identify user for server.

- Describe how web caching can reduce the delay in receiving a requested object. Will web caching reduce the delay for all objects requested by a user or for only some of the objects? (Why)?

  Ans:

  Web caching is defined as a temporary storage of documents such as images, video files, HTML pages to reduce the bandwidth usage.so it finds the desired content and brings the content close the user onto the same LAN of the host. with handles the requests send by the user's browser, which could be directed to the origin server and the same content is saved as cache files, The web caching can reduce the response time of the client's request when the bottle bandwidth between the client and the server is much less than the bottleneck bandwidth between the client and the cache.

- Consider the following string of ASCII characters that were captured by Wireshark when the browser sent an HTTP GET message (i.e, this is the actual content of an HTTP GET message). The characters are carriage return and line-feed characters (that is, the italized character string in the text below represents the single carriage-return character that was contained at that point in the HTTP header). Answer the following questions, indicating where in the HTTP GET message below you find the answer.

```
GET /cs453/index.html HTTP/1.1<cr><lf>Host: gai
a.cs.umass.edu<cr><lf>User-Agent: Mozilla/5.0 (
Windows;U; Windows NT 5.1; en-US; rv:1.7.2) Gec
ko/20040804 Netscape/7.2 (ax) <cr><lf>Accept:ex

t/xml, application/xml, application/xhtml+xml, text
/html;q=0.9, text/plain;q=0.8, image/png,*/*;q=0.5
<cr><lf>Accept-Language: en-us, en;q=0.5<cr><lf>Accept-
Encoding: zip, deflate<cr><lf>Accept-Charset: ISO
-8859-1, utf-8;q=0.7,*;q=0.7<cr><lf>Keep-Alive: 300<cr>
<lf>Connection:keep-alive<cr><lf><cr><lf>
```

A. What is the URL of the document requested by the browser?
B. What version of HTTP is the browser running?
C. Does the browser request a non-persistent or a persistent connection?
D. What is the IP address of the host on which the browser is running?
E. What type of the browser initiates this message? Why is the browser type needed in an HTTP request message?

Ans:
A) URL = Host + Request file
= http://gaia.cs.umass.edu + /cs453/index.html
= http://gaia.cs.umass.edu/cs453/index.html
B) HTTP/1.1 > version 1.1
C) Connection: keep-alive. > persistent connection
note: It does not require connection setup again and again. Multiple objects can use connection.
D) This information is not contained in an HTTP message anywhere. So there is no way to tell this from looking at the exchange of HTTP messages alone.
E) User-Agent: Mozilla/5.0 > Mozilla virsion 5.0

- The text below shows the reply sent from the server in response to the HTTP GET message in the question above. Answer the following questions, indicating where in the message below you find the answer.

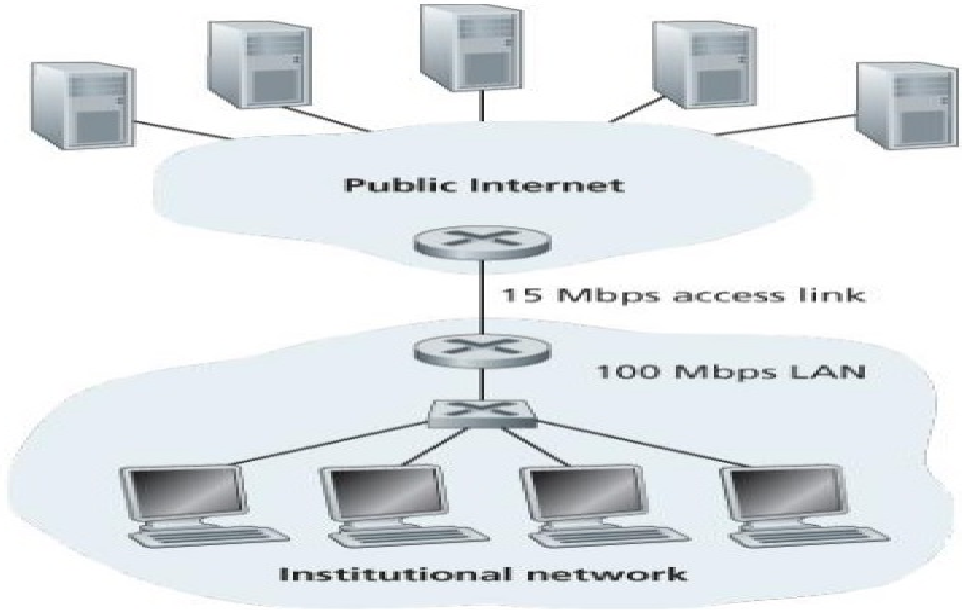
```
HTTP/1.1 200 OK<cr><lf>Date: Tue, 07 Mar 2008
12:39:45GMT<cr><lf>Server: Apache/2.0.52 (Fedora)
<cr><lf>Last-Modified: Sat, 10 Dec2005 18:27:46
GMT<cr><lf>ETag: "526c3-f22-a88a4c80"<cr><lf>Accept-
Ranges: bytes<cr><lf>Content-Length: 3874<cr><lf>
Keep-Alive: timeout=max=100<cr><lf>Connection:
Keep-Alive<cr><lf>Content-Type: text/html; charset=
ISO-8859-1<cr><lf><cr><lf><!doctype html public "-
//w3c//dtd html 4.0 transitional//en"><lf><html><lf>
<head><lf> <meta http-equiv="Content-Type"
content="text/html; charset=iso-8859-1"><lf> <meta
name="GENERATOR" content="Mozilla/4.79 [en] (Windows NT
5.0; U) Netscape]"><lf> <title>CMPSCI 453 / 591 /
NTU-ST550ASpring 2005 homepage</title><lf></head><lf>
<much more document text following here (not shown)>
```

A. Was the server able to successfully find the document or not? What time was the document reply provided?
B. When was the document last modified?
C. How many bytes are there in the document being returned?
D. What are the first 5 bytes of the document being returned? Did the server agree to a persistent connection?

Ans:
A) Http/1.1 200 ok > Yes, Tue - 07-Mar-2008
B) Last-Modified: > Sat, 10-Dec-2005 18:38:46GMT
C) Content-Lengh: > 3874 bytes
D) <!doc , Yes it's agree to a persistent connection

- Consider The below Figure , for which there is an insitutional network connected to the internet. Suppose that the average object size is 850,000 bits and that the average request rate from the institution's browsers to the origin servers is 16 requests per second. Also suppose that the amount of time it takes from when the router on the Internet side of the access link forwards an HTTP request until it receives the response is three seconds on average . Model the total average response time as the sum of the average access delay (that is, the delay from Internet router to institution router) and the average Internet delay. For the average access delay, use Δ /(1- Δ b) where Δ is the average time required to send an object over the access link and b is the arrival rate of objects to the access link.

  A. Find the total average response time.
  B. Now suppose a cache is installed in the institutional LAN. Suppose the miss rate is 0.4. Find the total response time.



Ans:
A)
 # Total average response time = average access delay + average Internet delay
 # average internet delay = 3 seconds
 # average request rate (b) = 16 requests/sec
 # average access delay =Δ /(1- Δ b)
 # time to transmit an object (Δ) = object Size / link or rate = (850,000)/((15*1024*1024)) =0.0540 sec
 # Δ b = 16*0.0540 = 0.864sec
average access delay = 0.0540/(1-0.864)=0.397058824s ≈0.40s
Total average response time = 0.397058824 + 3 = 3.397058824≈3.40

B)
 # Miss rate = 0.4
 # Access link is reduced = 1- Miss rate =0.6
 # average access delay =Δ /(1- Δ*b*Miss rate)
=0.0540/(1-0.864*0.4)=0.082518337s≈0.08s
 # Total average response time = 0.08 + 3 = 3.08s

 # Total average response time(with cach) = average access delay(without cach) * average response time(without cach) + Miss rate * average response time(with cach)
#The response time is approximately zero if the request is satisfied by the cache.
Total average response time(with cach) = (0.40*0)+(.4*3.08)=1.232s

- Consider distributing a file of F = 15 Gbits to 5 peers. The server has an upload rate of Us=30 Mbps, and peers have download rates di={4 Mbps, 2 Mbps, 1 Mbps, 0.5 Mbps, 400 Kbps}, and the upload rates of the peers are Ui={2 Mbps, 1 Mbps, 1 Mbps, 0.5 Mbps , 200 Kbps}. Considering Client-server model.
  A) calculate the minimum distributed time.
  B) considering P2P model

Ans:
A):
 # F = 15 Gbits = (15*1024*1024*1024*8)=128849018880 bits
 # N = 5 peers
 # Us= 30 Mbps = (30*1024*1024*8) = 251658240 bits
 # di={4 Mbps, 2 Mbps, 1 Mbps, 0.5 Mbps, 400 Kbps}
 # Ui={2 Mbps, 1 Mbps, 1 Mbps, 0.5 Mbps , 200 Kbps}
 # d_min = min{4 Mbps, 2 Mbps, 1 Mbps, 0.5 Mbps, 400 Kbps} =400 Kbps = (400*1024*8)=3276800 bits
 # NF/Us = (5*128849018880)/251658240=2560
 # F/d_min = 128849018880 / 3276800 =39321.6
 # Minimum Distributed Time =
Max{NF/Us,F/d_min}=Max{2560,39321.6}=39321.6s

B):
 # Ui={2 Mbps, 1 Mbps, 1 Mbps, 0.5 Mbps , 200 Kbps}
 # Ui={16777216 bps, 8388608 bps, 8388608 bps, 4194304 bps , 1638400 bps}
 # Minimum Distributed Time for P2P =
Max{NF/Us,F/d_min,NF/(Us+∑Ui)}
 # NF/(Us+∑Ui) = (5*128849018880)/291045376
=2213.555505517≈2213.55
Minimum Distributed Time = Max{NF/Us,F/d_min,NF/(Us+∑Ui)} =
Max{2560,39321.6,2213.55} =39321.6 s