44100113: COMPUTER NETWORKS
HOMEWORK 1: CHAPTER 2 Application Layer
SOLUTIONS

Notes: All exercises are in accordance with the 6th edition (International Edition). We change data values in some problems, which are highlighted.

Exercise 1 (R5)
The IP address of the destination host and the port number of the socket in the destination process.

Exercise 2 (R6)
You would use UDP. With UDP, the transaction can be completed in one roundtrip time (RTT) - the client sends the transaction request into a UDP socket, and the server sends the reply back to the client's UDP socket. With TCP, a minimum of two RTTs are needed - one to set-up the TCP connection, and another for the client to send the request, and for the server to send back the reply.

Exercise 3 (R23)
The overlay network in a P2P file sharing system consists of the nodes participating in the file sharing system and the logical links between the nodes. There is a logical link (an "edge" in graph theory terms) from node A to node B if there is a semipermanent TCP connection between A and B. An overlay network does not include routers.

Exercise 4 (P1)
a) **F**; The client should send four request message and receive four response messages.
b) **T**; These two pages are on the same server.
c) **F**; Only one request in a non-persistent connection.
d) **F**; The **Date: header** indicates the time and date when the HTTP response was created and sent by the server. The **Last-Modified:** header when the object in the response was last modified.
e) **F**; length=0 is allowed.

Exercise 5 (P4)
a) The document request was http://gaia.cs.umass.edu/cs453/index.html. The Host : field indicates the server's name and /cs453/index.html indicates the file name.
b) The browser is running HTTP version 1.1, as indicated just before the first <cr><lf> pair.
c) The browser is requesting a persistent connection, as indicated by the Connection: keep-alive.
d) This is a trick question. 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. One would need information from the IP datagrams (that carried the TCP segment that carried the HTTP GET request) to answer this question.

e) Mozilla/5.0. The browser type information is needed by the server to send different versions of the same object to different types of browsers.

Exercise 6 (P5)

a) The status code of 200 and the phrase OK indicate that the server was able to locate the document successfully. The reply was provided on Tuesday, 07 Mar 2008 12:39:45 Greenwich Mean Time.

b) The document index.html was last modified on Saturday 10 Dec 2005 18:27:46 GMT.

c) There are 3874 bytes in the document being returned.

d) The first five bytes of the returned document are: <!doc. The server agreed to a persistent connection, as indicated by the Connection: Keep-Alive field.

Exercise 7 (P7)

The total amount of time to get the IP address is

$$RTT_1 + RTT_2 + \cdots + RTT_n.$$

Once the IP address is known, RTT_0 elapses to set up the TCP connection and another RTT_0 elapses to request and receive the small object. The total response time is

$$2RTT_0 + RTT_1 + RTT_2 + \cdots + RTT_n.$$