

hwk3.ans

Chapter 2:

1. KR, #R3 - many people disagree on this definition for certain protocols.  
The process which initiates the communication is the client; the process that waits to be contacted is the server.
  
2. KR, #R5  
The IP address of the destination host and the port number of the socket in the destination process.
  
3. KR, #R8
  - a) Reliable data transfer
    - TCP provides a reliable byte-stream between client and server but UDP does not.
  - b) A guarantee that a certain value for throughput will be maintained
    - Neither
  - c) A guarantee that data will be delivered within a specified amount of time
    - Neither
  - d) Confidentiality (via encryption)
    - Neither
  
4. KR, #R11  
The applications associated with those protocols require that all application data be received in the correct order and without gaps. TCP provides this service whereas UDP does not.
  
5. KR, #R17

Example: (your email header will most likely be slightly different)

```
Received:      from 65.54.246.203 (EHLO bay0-omc3-s3.bay0.hotmail.com)
              (65.54.246.203) by mta419.mail.mud.yahoo.com with SMTP; Sat, 19
              May 2007 16:53:51 -0700
Received:      from hotmail.com ([65.55.135.106]) by bay0-omc3-s3.bay0.hotmail.com
              with Microsoft SMTPSVC(6.0.3790.2668); Sat, 19 May 2007 16:52:42 -
              0700
Received:      from mail pickup service by hotmail.com with Microsoft SMTPSVC; Sat,
              19 May 2007 16:52:41 -0700
Message-ID:    <BAY130-F26D9E35BF59E0D18A819AFB9310@phx.gbl>
Received:      from 65.55.135.123 by by130fd.bay130.hotmail.msn.com with HTTP;
              Sat, 19 May 2007 23:52:36 GMT
From:          "prithula dhungel" <prithuladhungel@hotmail.com>
To:            prithula@yahoo.com
Bcc:
Subject:       Test mail
Date:          Sat, 19 May 2007 23:52:36 +0000
Mime-Version: 1.0
Content-Type:  Text/html; format=flowed
Return-Path:   prithuladhungel@hotmail.com
```

Received: This header field indicates the sequence in which the SMTP servers send and receive the mail message including the respective timestamps. In this example there are 4 "Received:" header lines. This means the mail message passed through 5 different SMTP servers before being delivered to the receiver's mail box. The last (forth "Received:" header indicates the mail message flow from the SMTP server of the sender to the second SMTP server in the chain of servers. The sender's SMTP server is at address 65.55.135.123 and the second SMTP server in the chain is by130fd.bay130.hotmail.msn.com.

The third "Received:" header indicates the mail message flow from the second SMTP server in the chain to the third server, and so on.

Finally, the first "Received:" header indicates the flow of the mail messages from the forth SMTP server to the last SMTP server (i.e. the receiver's mail server) in the chain.

Message-id: The message has been given this number BAY130-F26D9E35BF59E0D18A819AFB9310@phx.gbl (by bay0-omc3-s3.bay0.hotmail.com).

Message-id is a unique string assigned by the mail system when the message is first created.

From: This indicates the email address of the sender of the mail. In the given example, the sender is "[prithuladhungel@hotmail.com](mailto:prithuladhungel@hotmail.com)"

To: This field indicates the email address of the receiver of the mail. In the example, the receiver is "[prithula@yahoo.com](mailto:prithula@yahoo.com)"

Subject: This gives the subject of the mail (if any specified by the sender). In the example, the subject specified by the sender is "Test mail"

Date: The date and time when the mail was sent by the sender. In the example, the sender sent the mail on 19th May 2007, at time 23:52:36 GMT.

Mime-version: MIME version used for the mail. In the example, it is 1.0.

Content-type: The type of content in the body of the mail message. In the example, it is "text/html".

Return-Path: This specifies the email address to which the mail will be sent if the receiver of this mail wants to reply to the sender. This is also used by the sender's mail server for bouncing back undeliverable mail messages of mailer-daemon error messages. In the example, the return path is "[prithuladhungel@hotmail.com](mailto:prithuladhungel@hotmail.com)".

6. KR, #P1

- a) F
- b) T
- c) F
- d) F
- e) F

7. KR, #P6

- a) Persistent connections are discussed in section 8 of RFC 2616 (the real goal of this question was to get you to retrieve and read an RFC). Sections 8.1.2 and 8.1.2.1 of the RFC indicate that either the client or the server can indicate to the other that it is going to close the persistent connection. It does so by including the connection-token "close" in the Connection-header field of the http request/reply.
- b) HTTP does not provide any encryption services.
- c) (From RFC 2616) "Clients that use persistent connections should limit the number of simultaneous connections that they maintain to a given server. A single-user client SHOULD NOT maintain more than 2 connections with any server or proxy."
- d) Yes. (From RFC 2616) "A client might have started to send a new request at the same time that the server has decided to close the "idle" connection. From the server's point of view, the connection is being closed while it was idle, but from the client's point

of view, a request is in progress.”

8. KR, #P7

The total amount of time to get the IP address is

$$RTT_1 + RTT_2 + \dots + RTT_n.$$

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  $2 * RTT_0 + RTT_1 + RTT_2 + \dots + RTT_n$

9. KR, #P19

a) The following delegation chain is used for `gaia.cs.umass.edu`

`a.root-servers.net`

`E.GTLD-SERVERS.NET`

`ns1.umass.edu(authoritative)`

First command:

```
dig +norecurse @a.root-servers.net any gaia.cs.umass.edu
```

```
:: AUTHORITY SECTION:
```

```
edu. 172800 IN NS E.GTLD-SERVERS.NET.
```

```
edu. 172800 IN NS A.GTLD-SERVERS.NET.
```

```
edu. 172800 IN NS G3.NSTLD.COM.
```

```
edu. 172800 IN NS D.GTLD-SERVERS.NET.
```

```
edu. 172800 IN NS H3.NSTLD.COM.
```

```
edu. 172800 IN NS L3.NSTLD.COM.
```

```
edu. 172800 IN NS M3.NSTLD.COM.
```

```
edu. 172800 IN NS C.GTLD-SERVERS.NET.
```

Among all returned edu DNS servers, we send a query to the first one.

```
dig +norecurse @E.GTLD-SERVERS.NET any gaia.cs.umass.edu
```

```
umass.edu. 172800 IN NS ns1.umass.edu.
```

```
umass.edu. 172800 IN NS ns2.umass.edu.
```

```
umass.edu. 172800 IN NS ns3.umass.edu.
```

Among all three returned authoritative DNS servers, we send a query to the first one.

```
dig +norecurse @ns1.umass.edu any gaia.cs.umass.edu
```

```
gaia.cs.umass.edu. 21600 IN A 128.119.245.12
```

b) The answer for `google.com` could be:

A.root-servers.net  
E.GTLD-SERVERS.NET  
ns1.google.com(authoritative)