ECE361 Homework 3

Lindy Zhai

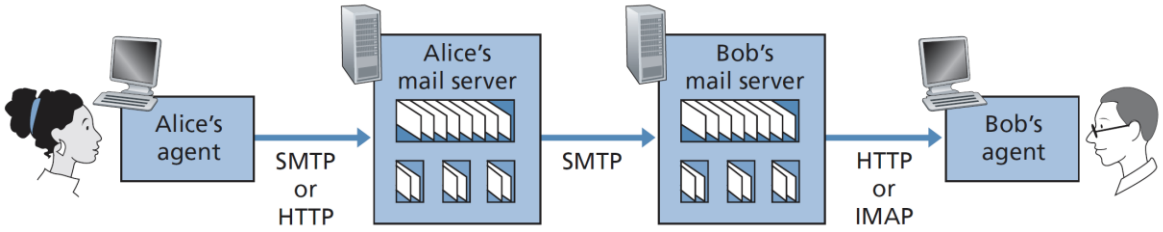
R11. Why do HTTP, SMTP, and IMAP run on top of TCP rather than on UDP?

The advantages of TCP over UDP are that it is a more reliable data transfer service, and it prevents data loss. Therefore, as HTTP, SMTP and IMAP protocols all have heavy emphasis on data security and thus cannot afford data loss, TCP is a better choice.

R12. 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.

When the customer enters the e-commerce site for the first time, the site will create a unique identification number and include a set-cookie header in the HTTP response. As the customer continues to browse the e-commerce site, at every request, the browser consults his/her cookie file and extracts her identification number while putting it in the HTTP request, which helps the e-commerce server to track customer's purchase activities.

R16. Suppose Alice, with a Web-based e-mail account (such as Hotmail or Gmail), sends a message to Bob, who accesses his mail from his mail server using IMAP. Discuss how the message gets from Alice's host to Bob's host. Be sure to list the series of application-layer protocols that are used to move the message between the two hosts.



Alice's user agent uses SMTP or HTTP to deliver the e-mail message into her mail server, then Alice's mail server uses SMTP (as an SMTP client) to relay the e-mail message to Bob's mail server. After that, Bob's user agent will use HTTP to retrieve Bob's e-mail.

R19. Is it possible for an organization's Web server and mail server to have exactly the same alias for a hostname (for example, foo.com)? What would be the type for the RR that contains the hostname of the mail server?

yes, mail server aliasing is possible. The type for the RR that contains the hostname of the mail server is MX.

P1.

a. *False, the client will send 4 request messages as each object is processed separately.*
b. *True, the two web pages are sent from the same server within the same TCP connection.*
c. *False, the nonpersistent connection close after processing one request message.*
d. *False, the header indicates when the response is prepared.*

P3.

Transportation layer protocol: TCP connection required for retrieving web document, to use the DNS for getting IP addresses, the UDP protocol will also be used.

Application-layer protocols: no other application layer protocol are used beside HTTP.

P9.

a.

$$\Delta = \frac{10^6}{100 \cdot 10^6} = 0.01s$$

$$\frac{\Delta}{1-\Delta\beta} = \frac{0.16}{1-0.16} = 0.190s$$

$$t = 0.190 + 3 = 3.19s$$

b.

$$\frac{\Delta}{1-\Delta\beta} = \frac{0.16}{1-0.4 \cdot 0.16} = 0.17s$$

$$t = 0.17 + 3 = 3.17094s$$

P13.

- **a.** $2000 + 3 \cdot 5 = 2015 \ \ frames$
- **b.** $6 \cdot 3 = 18 \ \ frames$

P16.

SMTP mark the end of a message body by a line containing only a period.

HTTP mark the end of a message body by providing the ***Content-Length*** *header line indicating the number of bytes in the object being sent.*

No, HTTP message could contain binary data, whereas the message body must be in ASCII format for SMTP.

P20.

We can use DNS cashes to determine the most popular server, this is because if more DNS request of the same server are sent by users, the more likely that server will appear in the DNS caches. Therefore, if we periodically check the DNS caches and count the appearing frequency of the same servers, we can estimate the popularity of the external servers.