

Application Layer (2)

1) Consider a network path between a browser and server. If the propagation delay between the client and the server is 150 msec, and assume the respond time in case non-persistent HTTP connections is 6.001 sec. solve the following:

a) Find number of objects in the requested file.

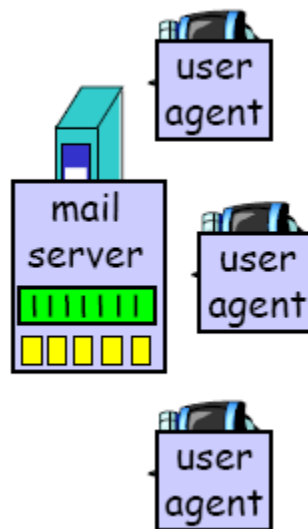
$$RTT = 2 * \text{propagation time} = 2 * 150 * 10^{-3} = 0.3 \text{ seconds.}$$

$$\text{Number of objects (n)} = 6.001 / (2 * RTT) = 6.001 / (2 * 0.3) = 10 \text{ objects.}$$

b) Assume persistent HTTP connections, what is the response time?

$$\text{Response time} = (n+1) * RTT \text{ (use the same values obtained from the previous problem).}$$

2) The figure below shows a mail server with three user agents. Answer the following questions.



a) The user agent can be a program that can be installed on the computer, or a web based interface that can be accessed using a normal web browser. What is the difference between the two?

i) User agent based solutions:

Access solutions installed and run on the user's computer. This includes:

- Access features built into the operating systems or browsers (platforms).
- Downloadable add-ons to platforms.
- And commercial assistive technologies that are installed on a computer.

This model takes advantage of the client computer's processing power in order to create faster response than server-based solutions. Additionally, these types of projects are currently the easiest to develop and deploy (especially the browser add-ons), since they require no added server side infrastructure. However, they require that users have permission to install and modify programs on every computer on which they may need access.

NOTE: Work is ongoing on a special tool that would allow some downloadable agents to run on a computer without installation to the disk. This approach is under development and would work on some operating systems. It will not likely work on a heavily locked down system however without cooperation from the system.

ii) Web-based user agents

Include web-based access technologies that can be used anywhere, from any internet-enabled device. Web anywhere is an example of this approach.

With this approach processing is done at a remote server, accessed through a specified URL, and does not involve any downloads or installation at the user's computer. Because these solutions reside on the server instead of the user's computer, personalized settings can be retrieved wherever the user logs in. This approach is particularly effective for individuals without resources who often are accessing the web through other people's computer such as libraries, or community centers

b) What is the protocol name that the user agent uses to retrieve messages from the mail server?

Popular protocols for retrieving mail include POP3 and IMAP4.

c) What is the protocol name that the mail server uses to send the messages to the other mail servers?

Sending mail is usually done using the SMTP protocol.