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Group 4

ASSIGNMENT 2

Part 2

Q1. Design a network application protocol for this application and justify your design decision. In your protocol design, you should address the following.

1. The communication patterns of the network application.

Diagram

Description automatically generated

The network diagram above depicts the communication pattern of our network application. Our group is using client-server architecture because in this method where clients do not communicate to each other (as you can see in the diagram) but to the server (job-creator) which is one of the conditions in questions (two jobseekers can’t communicate with each other).

1. Define the protocol design goals.
2. For communication protocol we choose TCP because transport layer protocols a respective application are chosen on the basis of their services along four dimensions namely reliable data transfer, throughput, timing and security

🡪For our network application we need a protocol which is reliable in data transfer and we choose TCP because it is a reliable protocol for transferring data. The reason is that it is a connection-oriented protocol used for reliable delivery of data. Since we know that TCP’s job is to provide applications with the illusion of two shared data queues in each direction — regardless of the fact that the sender and receiver machines are separated by a lossy network. Thus, whatever the sender writes to its local, TCP send queue should magically appear in the same order at the local TCP receive queue at the receiver, and vice versa. TCP implements this mechanism by breaking the queued application data into segments and retransmitting each segment until an acknowledgment (ack) has been received.

🡪 The throughput and the timing provided by TCP also seems appropriate for our network application

🡪 Since this is a basic application, we are not considering some possible security threats one can experience while using a TCP protocol.

1. For management protocol we have chosen POP3 (we have mentioned the reason in second question).
2. For security we used university’s local secured shell (alpha).
3. Define the message format, structure and semantics

The message format is functionable

1. Design the communication rules.

Jobseeker: <connects to service port 5056>

Jobseeker: HELO jobcreater client identifies itself

Jobcreater: 250 ok, Hello jobseeker server acknowledges client

Jobseeker: Mail From: <client@localhost> identifying sending client

Jobcreater: 250 <client@localhost> OK receives the messages and acknowledges

Jobseeker: RCPT TO : server@localhost identify target user

Jobcreater: 250 root…. Recipient OK receiver acknowledges

Jobseeker: DATA

Jobcreater: 354 Enter input, Request Job or exit

Jobseeker: Request Job

Jobcreater: 250 Message received

Jobcreater: Accept Job , Reject Job

Jobcreater: RCPT TO: clinet@localhost

Jobseeker: QUIT

Jobcreater: 221 Closing Connection

Jobseeker: Jobseeker quits.

Q2. Argue the need for a new application layer protocol for this network application instead of using existing standard protocols (e.g. HTTP, SMTP, WebSocket, etc.)

Answer – The reasons for why we need to use new application layer protocols over standard application protocols are

1. For electronic mail – Here, we choose POP3 over SMTP as it is easy to configure and is also quite popular. Also, it requires very less storage space as all the emails are stored on your local machine which also allows the users to access their emails when they are offline.
2. For File transfer – Here, we choose TFTP over FTP as we have a small application and TFTP does file transfer between client and server (and our group is also using client-server architecture)

All in all, from the above two examples we can conclude that since we are using client-server architecture, we should pick the new application layer protocols (instead of the standard application protocols) as some of them are based on the same principle and configures more precisely with our application.

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