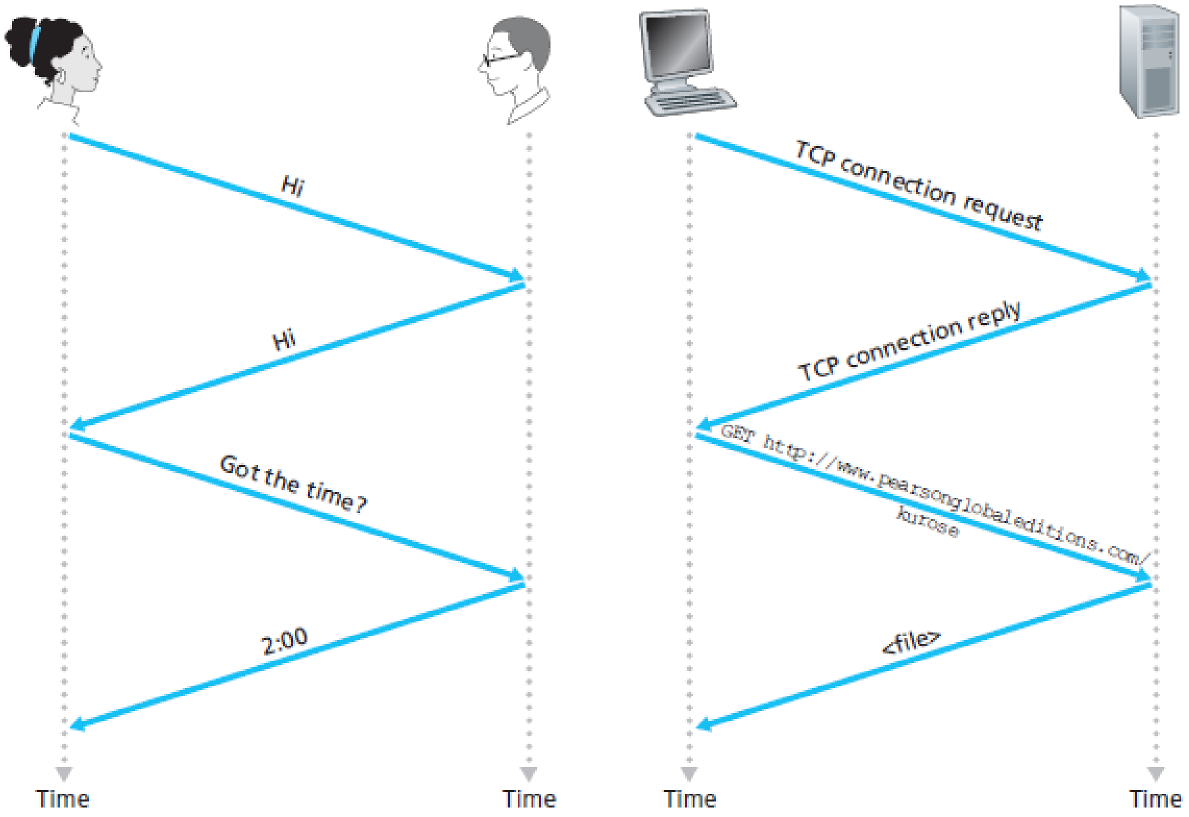
CS307 Computer Networks (Spring 2019)

Class Activity 2

Design and describe an application-level protocol to be used between an automatic teller machine and a bank's centralized computer. Your protocol should allow a user's card and password to be verified, the account balance (which is maintained at the centralized computer) to be queried, and an account withdrawal to be made (that is, money disbursed to the user). Your protocol entities should be able to handle the all-too-common case in which there is not enough money in the account to cover the withdrawal. Specify your protocol by listing the messages exchanged and the action taken by the automatic teller machine or the bank's centralized computer on transmission and receipt of messages. Sketch the operation of your protocol for the case of a simple withdrawal with no errors, using a diagram similar to that in the following figure.



A human protocol and a computer network protocol

Solution

There is no single right answer to this question. Many protocols would do the trick. Here's a simple answer below:

Messages from ATM machine to Server

Msg name	purpose
HELO <userid>	Let server know that there is a card in the ATM machine ATM card transmits user ID to Server
PASSWD <passwd>	User enters PIN, which is sent to server
BALANCE	User requests balance
WITHDRAWL <amount>	User asks to withdraw money
BYE	user all done

Messages from Server to ATM machine (display)

Msg name	purpose
PASSWD	Ask user for PIN (password)
OK	last requested operation (PASSWD, WITHDRAWL) OK
ERR	last requested operation (PASSWD, WITHDRAWL) in ERROR
AMOUNT <amt>	sent in response to BALANCE request
BYE	user done, display welcome screen at ATM

Correct operation:

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client                          server
HELO (userid)   --------------->  (check if valid userid)
                <--------------   PASSWD
PASSWD <passwd> --------------->  (check password)
                <--------------   OK (password is OK)
BALANCE         --------------->
                <--------------   AMOUNT <amt>
WITHDRAWL <amt> --------------->  check if enough $ to cover
                withdrawl
                <--------------   OK
ATM dispenses $
BYE             --------------->
                <--------------   BYE
```

In situation when there's not enough money:

```
HELO (userid)   --------------->  (check if valid userid)
                <--------------   PASSWD
PASSWD <passwd> --------------->  (check password)
                <--------------   OK (password is OK)
BALANCE         --------------->
                <--------------   AMOUNT <amt>
WITHDRAWL <amt> --------------->  check if enough $ to cover withdrawl
                <--------------   ERR (not enough funds)
error msg displayed
no $ given out
BYE             --------------->
                <--------------   BYE
```