Computer Networks : Assignment 2

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1. **Users may also disconnect arbitrarily by pressing Ctrl-C and not send an UNREGISTER message. How would you deal with such a scenario?**

   Whenever user arbitrarily disconnects by pressing Ctrl-C and does not send an UNREGISTER message, the server would raise an exception *java.net.SocketException: Connection reset.* In our implementation, we have handled this exception and have removed the user from the hash-table which maintains a list of all the registered users once the exception is raised.

2. **Also think and describe how would you extend the client and server applications to deal with offline users? Similar to the single and double checks in Whatsapp, a sender should be able to send messages to offline recipients and get notified later whenever the messages are delivered to them.**

   To extend this application to deal with offline users, we could modify the hash-table we maintain to have an additional field, i.e. the status of the user. As long as the connection socket between that particular receiver is active, the "status" would be set to "online". As soon as the receiver/user disconnects from the server, rather than removing the user from the hash-table, we would just update his "status" to "offline". Before sending a message to a client, the server would then first check for the receiver's status, given the receiver exists. If online, the server would forward the message as it currently does. If offline, the server would store these messages in a queue corresponding to that receiver and would send an apt response to the sender. When the receiver comes back online again, the sever would update its status to online and check for any messages in the queue corresponding to that receiver. It would then send all messages in the queue to the receiver and en-queue any other messages that come. As soon as the server receives a response from the user for receiving the message, the server would notify the sender about the delivery, just like WhatsApp does.(Note: Along with the message, the queue will also store the sender id)