NEPAL COLLEGE OF INFORAMTION TECHNOLOGY

BALKUMARI , LALITPUR

Time Bound Open Book Hybrid Examination

Level: Bachelor	Semester: Spring, 2020	Full Marks: 70
Programme: BE Software		Pass Marks: 31.5
Course: Network Programming		Time : 2 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

1. Connection establishment, data transfer and connection termination are three phases of communication between client/server applications using protocols that support error control and flow control. In order to complete this phase, protocol goes through various states. Imagine any simple client server application and explain the mechanisms of state changes with each message passing from one end to another end. 10

2. Network programming involves heterogeneous entities like different operating systems, architecture and hardware. So, information representation and sent by one entity may differ from other entities. Explain this situation on the basis of some example scenarios and methods to handle these issues. Present the situation where some socket APIs return EWOULDBLOCK, ECONNREFUSED and EAFNOSUPPORT. 10

   OR

   In a blocking socket , it doesn't return to the program until its request has been completed, but we can convert those blocking sockets into non-blocking sockets. Present your understanding of the necessity of non-blocking socket and process of converting blocking socket to non-blocking socket. Show the sample code to get the information like IP address of connected peers.

3. With an example scenario/application, explain the differences between a connected UDP socket and unconnected UDP socket. We encountered a problem when client call blocking system call and server terminated. In this case the server issues a TCP FIN to the client but the client doesn't get it since it is waiting for a blocking system call. Explain the meaning of the above problem and ways to resolve it. 10

4. There are mainly two types of communication approach between client and server, namely synchronous and asynchronous. We studied the Unix socket and winsock approach in network programming. Explain from your understanding, which types of programming approach is suitable and beneficial for the above listed type of communication and why? Also list some applications which should use the synchronous socket and asynchronous socket. 10

5. TCP sockets are full-duplex sockets. Is it possible to convert those sockets into half-duplex sockets? If possible-show the mechanism/if impossible-explain why. Do shutdown() and close() functions are different from WSACleanup() functions? Example how/how not. 10

6. Design and implement TCP Client and TCP Server applications using unix network 20

programming for providing registration numbers to the client.

Requirement:

1. The server contains a buffer in the linked list where each node contains information about the client. (node should contain Id, Name , Registration no and msg_sent_count)
2. The client establishes a connection to the server with its **unique ID number** (**use your roll no**) sent via command-line argument during sending a connection request.
3. The Server sends user information on the basis of the provided ID number. Search the above ID number in the linked list and prepare the message and send it to the client and increment msg_sent_count.
4. After sending client information from the server, print all information of the respective client in the server console as well.
5. After receiving the first message by the client, it prints the received message in its console and sends a 'Thank You' message to the server.
6. Server sends asking information immediately after receiving 'Thank You' message from client that if he wishes to see the same information again.
7. If Server receives Again messages from the client it sends the same information again and increments msg_sent_count for that client.
8. Your server must support multiple simultaneous connections.
9. If a client wants to quit, take input 'quit' from the console, and the client terminates. If a client wants to see the same information again, input 'Again' from the console and send a request to the server.
10. Your server must not support more than 10 simultaneous clients.

Use select() statement to check if the input is coming from the keyboard or from which of the clients.

- The server is started with:

tcpInfoServer –p port

- The client is started with:

tcpInfoClient –h serveraddress -p port -n IDNumber

Use the following messaging rules:

Information messages from the server to client

1Welcome <<Yourname>>, your unique identification key is <<Registration No.>>
(Replace <<Yourname>> and <<Registration No>> to your roll no and registration no)

3Do you want to see your information again?

Message from client to server to see information repetitively

2Thank You
4Again

Develop necessary protocols if required to complete the application.

Mark Distribution for Application

Evaluation : 60%- for designing system, protocol, communication mechanism, buffer handling and data structures.

40%- for implementation (Code part) – minor syntactical mistakes will be ignored, header files declaration are not necessary. Concern more about function, flow of program, user defined functions and programming logic etc.