AAST College of Computing and Information Technology

Network Protocols (CS422)

Spring 2014

Homework 4 (Total of 50 pts)

Due on May 18th 2014

No late submissions will be allowed

Q1. (5 pts) Write C source code to verify whether the IP address and ephemeral port assigned to a client TCP socket are assigned after calling *socket*, or after calling *connect*. What do you conclude?

Q2. (5 pts) Using your code in Q1, write C source code to estimate the connection timeout delay in effect on accessible lab machines for a TCP client/server connection. You can use the TCP daytime client/server as a starting point. *Hint*: set the time before attempting connection in the client. Attempt to connect to a non-existing IP address, then get the time after the *connect* call returns with a time out error. Try it on several machines report your results. What do you conclude?

Q3. (5 pts) Write C source code for a TCP server to test what happens if you passed the *backlog* value as 0. Will the server accept connections in that case? What can you conclude from this experiment? Attempt to try this experiment on a number of different operating systems.

Q4. (5 pts) Write C source code for a TCP server to test what happens if you removed the call to **bind**, but allowed the call to **listen**. Comment on your results. What would be the server port in that case? Can you display the server port?

Q5. (30 pts) Write TCP client/server programs with the following specifications.

TCP client

- The client connects to a TCP server. (The server's IP and port as passed to the client as command line arguments).
- Upon successful connection, the server sends back to the client the string "START".
- Upon receiving "START", the client displays 3 options for the user.
  - Option 1 is "get time of day"
  - Option 2 is "get connection history"
  - Option 3 is "Exit the program".

- If the user selects option 1, the client sends 1 to the server, which responds with the current time of day.
- If the user selects option 2, the client sends 2 to the server, which responds with the last 5 connections made to that server. The connection information includes the client's IP address, port.
- Assume that the client will only get one chance to choose his option and then the program exits after displaying the server's response(s) (The client will initiate active close).

TCP server

- The server is started with its server port as a command line argument.
- The server responds to client requests by sending the "START" string.
- Only 2 valid communicated values are expected from the clients: 1 or 2.
- Any other communicated values should be responded to with a "Service not provided" message.
- Would you choose to implement a concurrent server?

Your code should provide suitable error checking and diagnostic messages. For example, you need to handle the case where you try to bind the server port, and the port is already occupied (**bind** will return an error).