CSCE 313

QUIZ 5

Spring 2021

Total Points 100
Due Wednesday 4/28/21 at 11:59 pm

TRUE/FALSE QUESTIONS [1 pt each]

1. UDP protocol deals with retransmitting packets in case they are lost in route
2. TCP protocol is more heavy-weight because it maintains state information about the connection
3. Routing protocols are dynamic: they reconfigure under network topology change or outage automatically
4. Domain Naming System (DNS) can be used for load balancing and faster content delivery
5. The ping command is used to test whether you can make TCP connections with a remote host
6. The `accept()` function needs to be called the same number of times as the number of client-side `connect()` calls to accept all of them
7. HTTP protocol uses TCP underneath
8. Ports [0,1023] are reserved for well-known services (e.g., HTTP, SMTP, DNS, TELNET)
9. The master socket in a TCP server is used only to accept connections, not to run conversations with clients
10. A socket is a pair of IP-address and port number combination in both client and server side
11. For making a socket on the client side, the port number is chosen by the OS randomly from the available pool
12. A socket is like other file descriptors and is added to the Descriptor Table
13. UDP is connectionless while TCP is connection oriented
14. The `ping` command is used to test network reachability
15. The `bind()` function is used to set up a backlog of outstanding connections

SHORT ANSWERS

16. [25 pts] Examine the Tannenbaum's solution to the Dining-Philosophers problem posted in the following: https://legacy.cs.indiana.edu/classes/p415-sjoh/hw/project/dining-philosophers/index.htm.

A. [25 pts] Rewrite the given solution in C++ using the semaphore class from our class lecture, make sure the program compiles and runs. Test the program and verify that it works correctly and show that using screenshots.
B. [15 pts] Then, describe how this solution works and why it does not run into deadlocks.

17. [30 pts]: You are given the responsibility of managing your home network that has the private IP address range of 172.16.0.0/12.

(a) How many distinct internet-connected devices can your home support simultaneously?
(b) Is 173.16.0.1 a valid IP address in this range? How about 172.17.0.5? Explain your answer.
(c) You have disabled DHCP in your network. Now, can a friend, who has never been to your home before, expect to automatically connect to your wireless network given that he knows the network id and password key?

QUIZ 5

18. [30 pts]: Write a program that looks the IP addresses of a given host name (e.g., www.google.com) and filters those addresses based on a string matching. For example, the following were addresses returned by when I looked up www.google.com. Obviously, these addresses may change when you look them up yourself.

```
prompt:~$ dig +short www.google.com
142.250.138.103
142.250.138.106
142.250.138.105
142.250.138.147
142.250.138.99
142.250.138.104
```

Now, your program should take 2 arguments: the host name and the search string, like the following:

```
prompt:~$./a.out www.google.com 250
142.250.138.99
142.250.138.147
142.250.138.106
142.250.138.103
142.250.138.105
142.250.138.104
```

Notice that it is keeping all the entries because they all have the string “250” in them. If you rather use the search string “10”, it should give you the following output because only these IP addresses have the string “10” in them.

```
prompt:~$./a.out www.google.com 10
142.250.138.106
142.250.138.103
142.250.138.105
142.250.138.104
```

For comparison, you can use the following query to find out the expected output:

```
prompt:~$ dig +short <hostname> | grep <search string>
```

Restrictions: You cannot use “grep” or execvp() to take help from any of the Linux commands.

Write this program, name if dnsfilter.cpp and include it in your submission