

CSCD 330 Network Programming  
Take-Home Final  
Winter 2016

Due: Tuesday, March 15th, 2016

Do all work independently, if you use sources outside of the textbook, please cite them. Also, this final is to be turned in via paper copy.

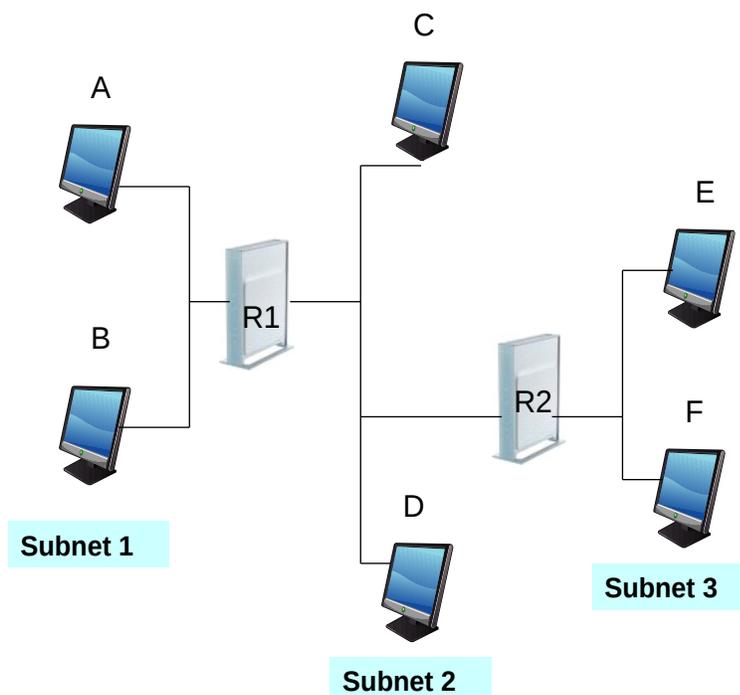
1. The Ping program as written relies on ICMP echo/reply messages. Is it possible to write the ping program in Java using ICMP messages? If yes, explain how you would implement it. If not, explain why its not possible. This is something you can research, its not an obvious answer.

2. a. What is an ARP Cache? b. Will a host update its ARP cache upon receiving any ARP request?

3. Nodes M, N and R are on a LAN network. If N wants to send M a message, how does N get the MAC address of M using ARP? Assume that N's ARP table is empty. What might an entry in the ARP table look like if we are using Windows? Make up IP and MAC addresses.

4. The java socket class allows for setting timeouts in the event communication is slow between client and server. Write a short snippet of code that defines a client socket and sets a timeout for a TCP client. Why do you want to use a timeout for a TCP client?

5. and 6. are based on the following Diagram.



## 5. Questions:

- a. Assign IP addresses to all of the interfaces. For Subnet 1, use addresses in the range 111.111.111.xxx. For Subnet 2, use addresses in the range 122.222.222.xxx. For Subnet 3 use addresses in the range 133.333.333.xxx.
- b. Assign MAC addresses to all the adapters. They don't have to be actual MAC address format, but simple numbers.
- c. Consider sending an IP datagram from Host A to Host F. Suppose all ARP table entries are current. Router table entries also are current. Enumerate the steps as the IP travels along the path especially noting the link layer actions.
- d. Repeat d. but now assuming the ARP table in sending host is empty but other ARP tables are up to date.

## 6. Questions

Redo the previous problem but substitute a switch for the Router 2 and answer the same questions a – d. Note. Redraw the diagram, it looks different with a switch instead of a router.

7. a. What is the difference between a broadcast domain and a collision domain?  
b. Why do you want to limit the number of computers within a broadcast domain?

8. This question has to do with Java threads.

8a. What is the difference between yielding and sleeping for a thread?

8b. What are three ways in which a thread can enter the waiting state?

9. In class we discussed the routing protocols, RIP and OSPF. What are some of the reasons you would choose to use OSPF over RIP within your network. Are there circumstances where it is preferable to use RIP over OSPF? Explain.

10. Now, you get to be creative in designing your own secure, efficient, reliable protocol out of carrier pigeons. For this problem, the Internet, phones and most other forms of communication do not exist. Most people use carrier pigeon to communicate with each other. Use your creativity and imagination. There are constraints on the protocol that must be followed. All else is allowed.

### Constraints

1. Your pigeons air space is regulated by the Federal Carrier Pigeon Regulatory Commission (FPCRC).

You can only fly your pigeons in your quadrant of Spokane. Spokane has been divided into 8 parts and you have purchased the right be in your partition. You could pay transit fees to other companies in other quadrants but you will lose some of your profits. You can decide how you want to handle this as a company.

2. There is a limit to the pigeon air space. You will not be able to fly all your pigeons at once. They will crash into each other. And it is also regulated by the FPCRC. So, at least  $\frac{1}{2}$

of your pigeons need to be grounded at one time. You will need to schedule the pigeons to deliver messages.

3. Pigeons are also homing pigeons so they return to their homes after delivering messages. So, they are their own AKC's. But, they can meet with problems along the way while aloft. Eagles, hawks love to eat pigeons. Hungry residents love to shoot pigeons as tasty treats. Pigeons don't see well and often fly into poles and electric wires dooming themselves and the messages they carry. You will need a strategy for resending messages if a pigeon should fail.

4. Your goal as any good American company is to maximize profit. How you do this comes down to your own nature. You can play fair or you can do some interesting things to out-compete your competitors. I leave this up to you !!!!

This question will be graded based on creativity and adherence to the constraints of the problem. You cannot create a protocol that violates all the constraints.