| CSE 473 – Introduction to Computer Networks	
	Studio 3
(*Adapted from Jon Turner's and Roch Guerin's Studios*)	

In this studio, you'll be building a simple *ring overlay network* and testing it in ONL. In your svn repository, you will find an ONL configuration file and three java files: *Ring.java*, *Packet.java* and *Pair.java*.

1. One student should login to ONL using one of the studio accounts (the TAs will tell you which one to use). Start the RLI, open the provided configuration file and commit it.

2. Copy the *studio3* directory to ONL. Read the comments at the start of *Ring.java* and then go through the code in all three files. Talk about it in your group, making sure everyone understands the way things work. Ask questions about anything you're not sure of.

3. Next, fill in the missing parts of the code (indicated by TODO in the provided code – basically, *Ring.java*). Again, talk over what you're doing and make sure that you all agree on how to complete the program.

4. The non-driver students in the group should now each open a command prompt window and *ssh* to ONL (using the studio account). In each window, type

   source /users/onl/.topology

   and then from *onlusr*, login to hosts $h4x2, $h2x3, $h7x1 and $h2x5 in your windows. In one window, run *Ring*, with the appropriate command-line arguments (include the *debug* argument). Then, run it again in each of the other windows, connecting each instance of *Ring* to one of the previous instances. Specifically, the instance on *h2x3* should be the successor of the instance on *h4x2*, and the instance on *h7x1* should be the successor of the instance on *h2x3*, and *h2x5* should be the successor of *h7x1*.
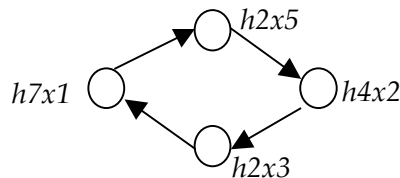
   Observe the packets being printed in each window. Are they what you expect? If not, figure out what changes are needed to your program and try again.

5. When your program is running correctly, you should be able to observe packets being forwarded between routers in the monitoring windows. Make sure that the curves that show packets being forwarded are consistent with what you expect.

   Now, click on port 2 of router 1 (aka NPR 1) and select the *filter table*. You should see a *packet filter* that has been configured for this port. Make sure you understand what this filter does, when it is enabled. Now, enable the filter by clicking the check box all the way at the right end of the entry, and selecting "commit" from the file menu. Observe the effect this has on the operation of the ring. Which nodes are no longer receiving ring test packets? Why? Can you see the effect of the filter in the monitoring display?