

# Csc72010

## Parallel and Distributed Computation and Advanced Operating Systems

### Homework 2

New due date: Thursday, March 8

### Reading

Distributed Algorithms, Chapter 8 and Chapter 14-15.1

Chapters 3 and 4 have some proofs for synchronous systems that may help you with understanding why the algorithms work. However, the proofs have to be modified drastically to work for the asynchronous case. In particular, note that all the automata take steps at once in the synchronous case, but only a few of them may do anything in a particular step of the asynchronous case.

### Exercise

Identify the safety properties of the following algorithms, identify state invariants from which the safety properties follow, and prove the state invariants.

(From Homework 1)

1. Write a ttoa that implements the sliding window algorithm. Show that the algorithm has the following desirable properties:
  - a. Messages are delivered to the receiving application in the order that they were sent.
  - b. Each message is delivered to the receiving application at most once.
  - c. If the channel drops only a finite number of messages, then all messages are delivered to the receiving application.
2. Fill in the details in the learning bridge algorithm.
  - a. Discuss what happens if switches forward messages out all ports, instead of all ports except the incoming port.
  - b. Discuss what happens if switches are connected to each other in a cycle.