Informatics and Mathematical Modelling *HHL 2008—09–19*
Technical University of Denmark
Building 321
DK–2800 Lyngby
Denmark

02152 CONCURRENT SYSTEMS FALL 2008

CP Exercise Class 3

Monday September 22

Temporal Logic

1. Let $Snows(x)$ denote that it snows at destination x. Express the following using temporal logic:

(a) It never snows at Bermuda.

(b) If it snows in Helsinki it also snows in Finland.

(c) If it snows in Norway, it will eventually snow in Sweden.

(d) It will always snow again in New Zealand and Danmark, but never at the same time.

(e) If it should ever snow in Sahara, it will never stop.

(f) It always snows somewhere.

Safety and Liveness

2. Do Exercise Theory.1. You may skip question 1.3(b) to leave time for the semaphore problems.

[This exercise could have been an exam problem (approx. 45 minutes).]

Semaphores

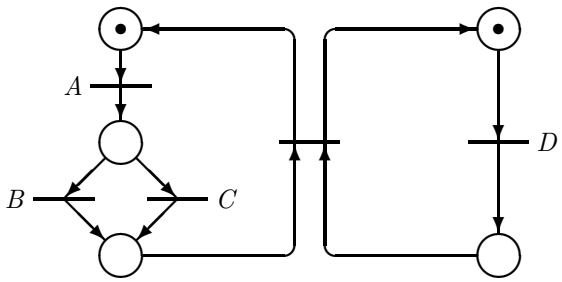
3. Do Exercise Sema.1.

4. Do Exercise Sema.2. (You can find the solution to Petri.2 on the reverse.)

5. Do Exercise Sema.4.

Solution for Petri.2

(a) The simplest Petri Net becomes:



It is seen that it is necessary to introduce an anonymous transition that ensures that the two sequential processes are synchronized in each round. (This synchronization may also be expressed in other, less obvious, ways.)

(b) From the above net it is seen that $(A, D), (B, D), (C, D)$ can be executed concurrently. (Since there exists behaviours of the net in which the corresponding transitions may fire simultanuously.)

(c) For the first round, we get the following six possible interleavings:

A, B, D	A, C, D
A, D, B	A, D, C
D, A, B	D, A, C