Exercises werkcollege 5, FMSE

Exercise 1

A variable stores values in the range `0..N` and supports the actions read and write. Model the variable as a process `VARIABLE` using FSP. For `N=2`, check using LTSA that it can perform the trace:

```
write.2->read.2->read.2->write.1->write.0->read.0
```

Exercise 2

A sensor measures the water level of a tank. The level (initially 5) is measured in units 0..9. The sensor outputs a low signal is the level is less than 2 and a high signal if it is greater than 8, otherwise it outputs that it is normal. Model the sensor as an FSP process SENSOR with alphabet {`level[0..9],high,low,normal`}.

Exercise 3

A simplified simple model of the behaviour of a student consists of three states: `SLEEP`, `STUDY`, and `DRINK`. From any state it is possible to reach the `SLEEP` state by the action `sleep`. In the `STUDY` state one can `study` and remain in that state, and in `DRINK` one can `drink` and remain in that state. From `SLEEP` one can get to `STUDY` by `eat`ing, and from `STUDY` to `DRINK` by `drink`ing.

a) Give a specification in FSP of the behaviour of a student.
b) Give a specification of the behaviour as a parallel composition of two student friends who eat and sleep independently, but always study and drink together. Also give the corresponding labelled transition system.
c) Give a specification of a *sequential* process that has the same observable behaviour as the two student friends of b).

Exercise 4

Consider the process `ELEMENT=(up->down->ELEMENT)` that accepts an `up` action and then a `down` action. Using parallel composition and the `ELEMENT` process give a model that can accept 4 `up` actions before a `down` action.

Exercise 5

Consider the corrected `MUSEUM` specification of lecture 5 (can be retrieved from the web page). Because the counter increment and decrement do not coincide with visitors entering and leaving the museum, respectively, there are systems states where the `COUNTER` differs 1 from the actual number of visitors inside the museum. Write a `TEST` process to determine whether there are reachable states where this difference is greater than 1. Check this with LTSA for `MAX=2`. What do you conclude?