SE Lab Assignment 5

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1. There are four philosophers sitting around a round table. There are forks on the table, one between each pair of philosophers. The philosophers want to eat spaghetti from a large bowl in the center of the table. Unfortunately the spaghetti is of a particularly slippery type, and a philosopher needs both forks in order to eat it. The philosophers have agreed on the following protocol to obtain the forks:

Initially philosophers think about philosophy, when they get hungry they do the following:

- Take the left fork

- Take the right fork and start eating

- Return both forks simultaneously, and repeat from the beginning.

Build a SPIN model for this scenario.

Source Code:

```
#define N 4
byte fork[N];
byte nr_eat;
proctype Philosopher(byte id)
{
    Think:
        printf("Plilosopher with id %d is thinking\n",id);
        if
        :: atomic { fork[id] == 0 -> fork[id] = id + 1; };
        :: atomic { fork[(id + 1)%N] == 0 -> fork[(id + 1)%N] = id + 1; };
        fi;
    One:
        if
        :: atomic
        {
            fork[id] == id + 1 -> fork[(id + 1)%N] == 0 -> fork[(id + 1)%N] = id + 1;
            nr_eat++;
        }
        :: atomic
        {
            fork[id] == 0 -> fork[(id + 1)%N] == id + 1 -> fork[id] = id + 1;
            nr_eat++;
        }
        fi;
    Eat:
        printf("Plilosopher with id %d is eating\n",id);
        d_step { nr_eat--; fork[(id + 1)%N] = 0; fork[id] = 0;}
    goto Think;
}

init {
    atomic
```

```
    {
        byte i = 0;
        do
        :: i < N -> run Philosopher(i); i++;
        :: else -> break;
        od;
    }
}
```

Output:

```
himani@Himani:~$ cd Desktop/SE/Assgn5/
himani@Himani:~/Desktop/SE/Assgn5$ touch q1.pml
himani@Himani:~/Desktop/SE/Assgn5$ spin q1.pml
              Plilosopher with id 1 is thinking
          Plilosopher with id 0 is thinking
                      Plilosopher with id 3 is thinking
                  Plilosopher with id 2 is thinking
                  Plilosopher with id 2 is eating
                  Plilosopher with id 2 is thinking
              Plilosopher with id 1 is eating
              Plilosopher with id 1 is thinking
          Plilosopher with id 0 is eating
          Plilosopher with id 0 is thinking
              Plilosopher with id 1 is eating
              Plilosopher with id 1 is thinking
                  Plilosopher with id 2 is eating
                  Plilosopher with id 2 is thinking
          Plilosopher with id 0 is eating
          Plilosopher with id 0 is thinking
              Plilosopher with id 1 is eating
              Plilosopher with id 1 is thinking
                  Plilosopher with id 2 is eating
                      Plilosopher with id 3 is eating
                  Plilosopher with id 2 is thinking
                      Plilosopher with id 3 is thinking
      timeout
#processes: 5
                fork[0] = 1
                fork[1] = 2
                fork[2] = 3
                fork[3] = 4
                nr_eat = 0
153:    proc  4 (Philosopher:1) q1.pml:16 (state 11)
153:    proc  3 (Philosopher:1) q1.pml:16 (state 11)
153:    proc  2 (Philosopher:1) q1.pml:16 (state 11)
153:    proc  1 (Philosopher:1) q1.pml:16 (state 11)
153:    proc  0 (:init::1) q1.pml:40 (state 11) <valid end state>
5 processes created
himani@Himani:~/Desktop/SE/Assgn5$
```