

Homework assignment 4

T-106.420 Concurrent Programming

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1 Exercise

Explain briefly the following two signalling disciplines

1.1 a) Signal and Continue

When a signal is executed by a process, the process that executes the signal continues his execution and the process that is awoken executes at a later time.

1.2 b) Signal and Wait

When a signal is executed by a process, the process that executes the signal, executes at a later time, and the process awoken executes now.

2 Exercise

Use a monitor to implement an ordinary semaphore. Your answer must show the declaration and initialization of all variables and condition variables you use within the monitor, as well as all monitor procedures that are necessary to implement the semaphore operations.

```
monitor Semaphore {
    int s = 0;
    cond pos;

    procedure Psem() {
        while (s == 0) wait(pos);
        s = s - 1;
    }
    procedure Vsem() {
        s = s + 1;
        signal(pos);
    }
}
```

3 Exercise

Given are N birds and one parent bird. Each bird is represented by a process. The baby birds eat out a common dish that initially contains W worms. Each baby repeatedly sleeps for a while, wakes up and eats one worm, then goes back to sleep. If the dish is empty, the baby bird who finds the dish empty awakens the parent bird. The parent flies off, finds W more worms, puts them all into the dish, and goes back to sleep.

Develop a monitor to synchronize the actions of the birds. Define the monitor's operations, show how they are used by the baby and parent birds, and show how they are implemented by the monitor. Be sure to declare and initialize all the variables you need. Also state which monitor signalling discipline you are using.