

## BLG312E Computer Operating Systems

### Homework 2

**Submission Deadline: 29 April 2022 23:59**

Write and test a C program that implements the described behavior below. In this homework, there will be one process with three threads.

You should submit your source file to Ninova. **You need to include comments in your source code.**

**Description:** In a company the human resources (HR) department deals with hiring new employees. In this *department*, there is one *receptionist* and three *interviewers*.

**When** an applicant arrives at the *department*, the *receptionist* registers him/her. After this step, the *receptionist* sends the applicant into the waiting room. Whenever one of the *interviewers* becomes available, he/she calls the first applicant in line and interviews him/her.

While the *interviewers* interview the applicants, the *receptionist* continues registering incoming applicants. (Note: Assume that the waiting room has infinite capacity.)

You are required to model this HR *department* as a process with the *interviewers* and the *receptionist* as threads of this process. **The *receptionist* needs  $nr$  seconds to register** each applicant (this time is fixed and is read as a command line argument). **Interviewing an applicant takes  $ni$  seconds** for an *interviewer* and  $ni$  depends on the job position the applicant is applying for.

To simulate applicants with different types of position applications, an *interviewer* thread should read the time it will take to interview the current applicant from an input file.

(**Hint:** To simulate the waiting times during the registration and interview stages, you can use the “sleep” command.)

#### **Important note:**

- **For this homework, you are required to model the HR *department* as ONE process with FOUR threads (one *receptionist* thread and three *interviewer* threads).**
- Solving the problem with multiple processes and no threads, will NOT get any points.
- Please preserve the order and meaning of the program arguments.
- Please test your program with different input files and make sure to achieve expected results.
- Please check that your program correctly removes all allocated resources (e.g. shared memory locations, semaphores, and any others you have used).
- **Any type of plagiarism will not be tolerated.**

**Input parameters and input file formats:** Input files for testing your program must be in the format given below where each line contains the *ni* interviewing times for each applicant. Input file must be in “.txt” file format. Assume that there are 4 applicants with following interviewing times. For example, interviewing time for the first applicant is 50 seconds, for the second one 30 seconds, so on.

**Input.txt**

```
50
30
70
60
...
..
```

**Test:** Your program will be tested in the form:

```
./program input.txt nr
```

**Output format:** Your program must print the events on the screen in their order of occurrence in the format given below. Assume that *nr* = 1 seconds in this example.

```
Applicant 1 applied to the receptionist
Applicant 2 applied to the receptionist
Applicant 3 applied to the receptionist
Applicant 4 applied to the receptionist
Applicant 1's registration is done
Interviewer 1 started interview with Applicant 1
Applicant 2's registration is done
Applicant 3's registration is done
Interviewer 3 started interview with Applicant 2
Interviewer 2 started interview with Applicant 3
Applicant 4's registration is done
Interviewer 3 finished interview with Applicant 2
Interviewer 3 started interview with Applicant 4
Interviewer 1 finished interview with Applicant 1
Interviewer 2 finished interview with Applicant 3
Interviewer 3 finished interview with Applicant 4
All applicants have interviewed successfully.
```