

BRAC UNIVERSITY
Department of Computer Science and Engineering
CSE321: Operating Systems

Midterm Exam
Duration: 1 Hour 10 minutes

Fall 2021
Total Marks: 35

1.
 - a) Explain how the operating system itself is started. [2]
 - b) Why do we need to install an operating system in a computer? Why just copying operating system related files and directories in the proper location of the disk should not work as a replacement? [3]
 - c) Give two separate examples when a process changes its state to waiting and ready from the running state. [4]
 - d) What is the difference between data parallelism and task parallelism? Explain with examples. Justify if it is possible to do both at the same time. [4]
 - e) Can multilevel feedback queue prevent starvation of processes? Give reasons behind your answer. [2]
2. Find the output of the following pseudo-code snippet. [4]

```
pid1 = 0;
pid2 = 0;
pid3 = 0;
data = 0;
main() {
    data = 10;
    pid2 = getpid();
    pid1 = fork();
    if (pid1 == 0) {
        waitForProcess(pid2);
        data = data - 1;
        pid1 = getpid();
        print("Process Id: " + pid1 + " data: " + data);
        exit;
    } else {
        pid3 = fork();
        if (pid3 == 0) {
            waitForProcess(pid1);
            pid1 = getpid();
            print("Process Id: " + pid1 + " data: " + data);
        } else {
            data = data + 1;
            pid1 = getpid();
            print("Process Id: " + pid1 + " data: " + data);
            exit;
        }
    }
}
```

3. You have the money to buy either a 4 core or an 8-core processor. However, an 8-core processor costs 10 thousand taka more than a 4-core processor. You decide to only buy an 8-core processor if the programs you execute run at least 30% faster in it than what they do in a 4-core processor. Now, if all your programs are 40% serial/sequential then would you buy the 8-core processor? Justify your answer by showing proper computation. [5]

4. An operating system uses SRTF CPU scheduling algorithms. Consider the arrival times and execution time for the following process.

| Process | Arrival Time | Burst time |
|---------|--------------|------------|
| P1 | 0 | 20 |
| P2 | 15 | 25 |
| P3 | 30 | 10 |
| P4 | 45 | 15 |

- a) Draw a gantt chart of their scheduling.
b) Find the total waiting time and turnaround time for process P2.
c) How many context switches are needed in implementing this algorithm.

[2]
[2]
[1]

5. Consider the information of the processes in a system given below.

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1 | 0 | 148 |
| P2 | 250 | 120 |
| P3 | 100 | 156 |
| P4 | 25 | 85 |
| P5 | 300 | 156 |

Using the RR policy with a time quantum of 40 time units,

- a) Construct a Gantt chart of the execution
b) Calculate average waiting time, and average response time for all processes.

[3]
[3]