FIT9137 Workshop

Week 4

Topics:

- Introduction to computer input and output operations, and operating system managing programs and processes.

Covered Learning Outcomes:

- The Operating system manages input/output operations and processes.

Instructions:

- One of the main targets of workshops is to anchor the learner into the session and create many opportunities to reinforce the learning in different ways – individually and in small groups. Sometimes we also teach key practical/theoretical concepts to you during these sessions.
- Form groups of 4-5 students to work through the exercises. If you meet a problem, try to solve it within your group by discussing it with your group members. If not resolved within the group, ask one of the support tutors to help you.
- You still have a question? Jump into one of many consultation hours run by our experienced tutors and seek help. Please visit the "Teaching Team and Unit Resources" tile in the FIT9137 Moodle site.

Activity A: Different types of Input/Output (I/O) Mechanisms

The CPU needs to receive data from and send data to Input and Output (I/O) devices. In this activity, we will explore different types of I/O mechanisms applied in computer systems. They are: (i) Memory-mapped I/O & Port-mapped I/O, (ii) Polling, Interrupts and DMA.

Activity B: Process Management - Round Robin Scheduling

In a multi-processing environment, a lot of processes are running simultaneously. But CPUs can only execute one instruction at a time. The Operating System (OS) switches periodically between processes. If switching is fast and occurs often, it creates the illusion of concurrency. This illusion works for both programmers and end users. One method for achieving a fair schedule of process switches is round-robin time-slicing.

Suppose the time quantum of a Round Robin scheduler is 50 milliseconds. The start time and the time it takes to finish processes 1-5 are given in below table:

Label	Arrival time	Processing time
Process 1	0	95ms
Process 4	15 ms	65ms
Process 5	75ms	35ms
Process 3	175ms	145ms
Process 2	201ms	10ms

Note: If a process's execution completes before the pre-set time quantum passes, then the OS dispatches the next process immediately (without waiting idle for the remaining duration of the pre-set time quantum). Also, for simplicity, we ignore the context switching time, i.e. the time taken to take a process out of the CPU and bring a new process from memory to CPU.

Answer the following questions:

a) Which process starts first?
b) Which process finishes last? When does it finish?
c) Which process finishes second last?
d) Show all the steps of the Round Robin algorithm using a queue.