INSTITUTE OF TECHNOLOGY TRALEE

Semester 2 Repeat Examination 2010

Operating Systems
(CRN 43835)

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Duration: **2 Hours**

Instructions to Candidates: Answer **any THREE** Questions.
All questions carry equal marks.

Question 1. Process Management

Note: assume here that there is a single CPU.

(a) Describe the 3 states of a process. **(9 marks)**
(b) Give a diagram to illustrate process state transitions. Describe each possible transition that can occur.
To illustrate your answer, use the following example. Suppose you run Microsoft Word on your system. Describe when the process is in each of the 3 states and when the state transitions would occur. You may assume there are other processes running on your system also. **(16 marks)**

(c) One method of performing input/output is with interrupts. Describe this method. **(8 marks)**

Question 2. CPU Scheduling

Note: assume here that there is a single CPU.

(a) The CPU scheduler is part of the operating system. Give a brief description of its function. Describe any two goals of the scheduler. **(5 marks)**

(b) The following table shows the arrival and burst times of 4 processes:

Process	Arrival Time	Burst Time
P1	0	5
P2	3	8
P3	6	6
P4	8	3

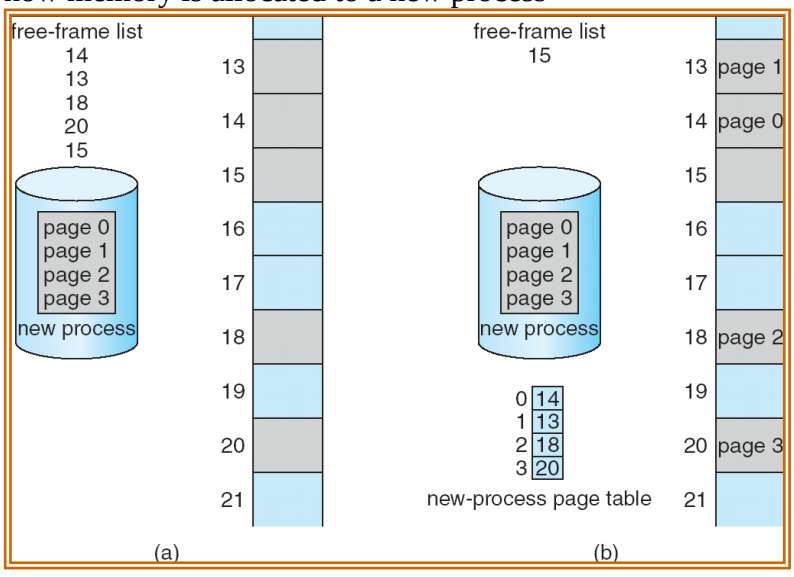
Draw Gantt charts for each of the following scheduling algorithms:
(i) FCFS (First-Come, First-Served)
(ii) Nonpreemptive SJF (Shortest-Job-First)
(iii) Preemptive SJF (also called Shortest-Remaining-Time-First (SRTF))
(iv) Nonpreemptive Priority. The processes have priorities 3, 1, 2, 4 respectively. Note: the smaller the integer the higher the priority.
(v) Preemptive Priority. The priorities are as in (iv) above.

For each algorithm give the waiting time of each process and the average waiting time. State which algorithm produces the best results for waiting times. Explain why this is so.
(28 marks)

Question 3. Memory Management

(a) Paging is one method that can be used to allocate memory.
(i) Describe this method. In your answer, include an explanation of the following terms: frame, page, page table, internal fragmentation. **(13 marks)**

(ii) When a new process arrives to be executed, the operating system must allocate memory to it. The following diagram shows how memory is allocated when paging is the method used. (a) is before allocation. (b) is after allocation. Using this diagram, describe how memory is allocated to a new process **(13 marks)**



(b) Virtual memory uses paging but all of the pages for a process may not be in memory. Give a brief description of how virtual memory is implemented. **(7 marks)**

Question 4. Linux

(a) The following Linux commands are issued in the order specified. Describe the effect of each command. Assume you are in your home directory initially and that it has a file called file1.

(i) man pwd
(ii) pwd
(iii) cp file1 file2
(iv) mkdir newdirectory
(v) cp file1 newdirectory
(vi) cd newdirectory
(vii) ls
(viii) rm file1
(ix) cd ..
(x) rmdir newdirectory **(20 marks)**

(b) Assume you are in your home directory initially i.e. /home2/t00012345 and that it contains a directory called myfiles and that myfiles has a directory called notes. Give the command to change to notes directory using (i) absolute pathname and (ii) relative pathname. **(4 marks)**

(c) The following is one of the lines of output from the ls –l command:

drwxr-xr-x 2 t00012345 students 4096 2010-01-22 15:30 newdirectory

Explain the meaning of drwxr-xr-x in this output. Give the command you would issue so that the owner has complete access (i.e. all access rights) to this item and the group and all others have no access. **(9 marks)**