Institiúid Teicneolaíochta, Trá Lí
INSTITUTE OF TECHNOLOGY - TRALEE

SUMMER EXAMINATION, 2011
AY 2010/2011

Operating Systems
CRN 43834

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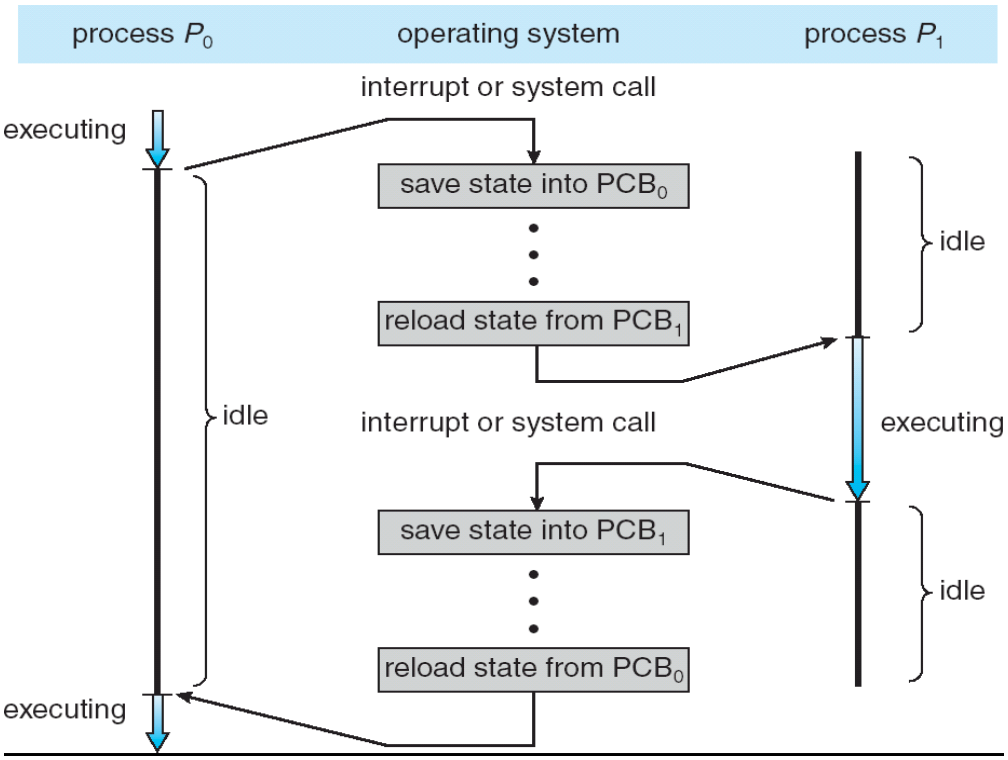
Duration of Exam: **2 hours**

Instructions to candidates: Answer any **THREE** questions. All questions carry equal marks **(33 marks)**.

Question 1. Process Management and CPU Scheduling



(a) The diagram above displays the CPU switching from process P_0 to P_1 and vice versa. Explain what is happening in this diagram. In your answer refer to the following: states of a process, context switch, PCB (process control block). **(20 marks)**

(b) Windows 7 and Linux use a version of priority scheduling algorithm.

(i) Briefly describe this type of scheduling. **(3 marks)**

(ii) The following table shows the arrival times, burst times and priorities of 4 processes:

Process	Arrival Time	Burst Time	Priority
P1	0	5	2
P2	2	4	4
P3	3	2	1
P4	6	4	3

Draw Gantt charts for the following scheduling algorithms:

- Nonpreemptive Priority
- Preemptive Priority.

Note: the smaller the integer, the higher the priority. **(6 marks)**

For **one** of these algorithms, give the waiting times of each process and the average waiting time. **(4 marks)**

Question 2. Memory Management

(a) Contiguous Allocation is one method that can be used to allocate memory.

(i) Explain how fragmentation of memory can occur with contiguous allocation i.e. available memory can comprise a set of holes (free blocks) of various sizes scattered throughout memory. **(5 marks)**

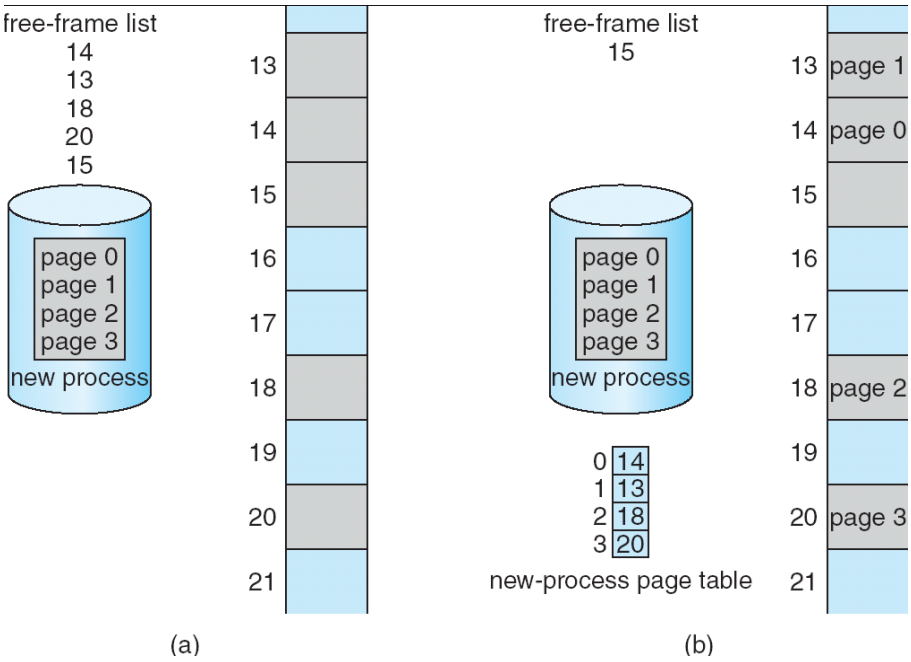
(ii) Contiguous Allocation can use one of following three algorithms:

- First-fit allocation
- Best-fit allocation
- Worst-fit allocation

Briefly describe each of these algorithms. **(6 marks)**

(iii) Assume memory has the following holes (free blocks) in order:
10K, 30K, 5K, 20K, 15K, 20K.
How would each of the first-fit, best-fit, and worst-fit algorithms place processes of 20K, 10K, 5K (in that order)? **(9 marks)**

(b) Paging is another method that can be used to allocate memory whereby the memory occupied by a process is noncontiguous. 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)**



Question 3. Performance of your computer

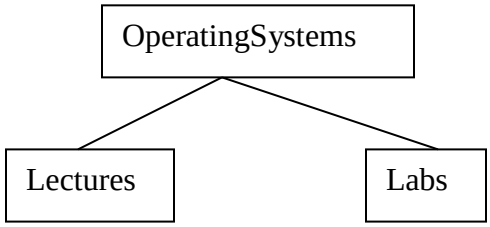
Performance problems can occur with the following computer components:

- CPU
- Memory (RAM)
- Primary Hard Disk

For **any two** of these components
(a) describe one reason for poor performance **(12 marks)**
(b) describe how you would identify that there is a problem **(9 marks)**
(c) how the problem can be resolved **(12 marks)**

Question 4. Linux

(a) Below is a diagram of a directory structure:



OperatingSystems directory has two directories: Lectures and Labs.
OperatingSystems directory has files CourseDetails and AttendanceRegister
Lectures folder has files lecture1 and lecture2.
Labs folder has files lab1, lab2 and lab3.

Assuming that you are in OperatingSystems directory initially, give the commands to do the following:

(i) copy CourseDetails to Lectures directory
(ii) remove AttendanceRegister
(iii) change to Labs directory
(iv) make two new directories in Labs called Windows and Linux
(v) move lab1 to Windows
(vi) move lab2 to Linux
(vii) list the files in Labs directory
(viii) print the path name of the current directory. **(16 marks)**

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

-rwxr--r-- 1 t00012345 students 4096 2011-03-17 14:30 datafile

(i) Explain the meaning of rwxr--r-- in this output. **(6 marks)**

Assume the following command is given:
chmod go+w datafile

(ii) What changes does this command make to the permissions on datafile? **(3 marks)**

(iii) What changes would this command make to the output from the ls-l command? **(3 marks)**

(c) The following is one of the lines of output from the **ps aux** command:

USER	PID	%CPU	%MEM	VSZ	RSS	TTY	STAT	START	TIME	COMMAND
15079	16517	99.4	0.0	4168	468	pts/0	R	14:40	3:28	yes

Explain the meaning of the values for the yes process in the following columns: PID, %CPU, STAT and START. **(5 marks)**